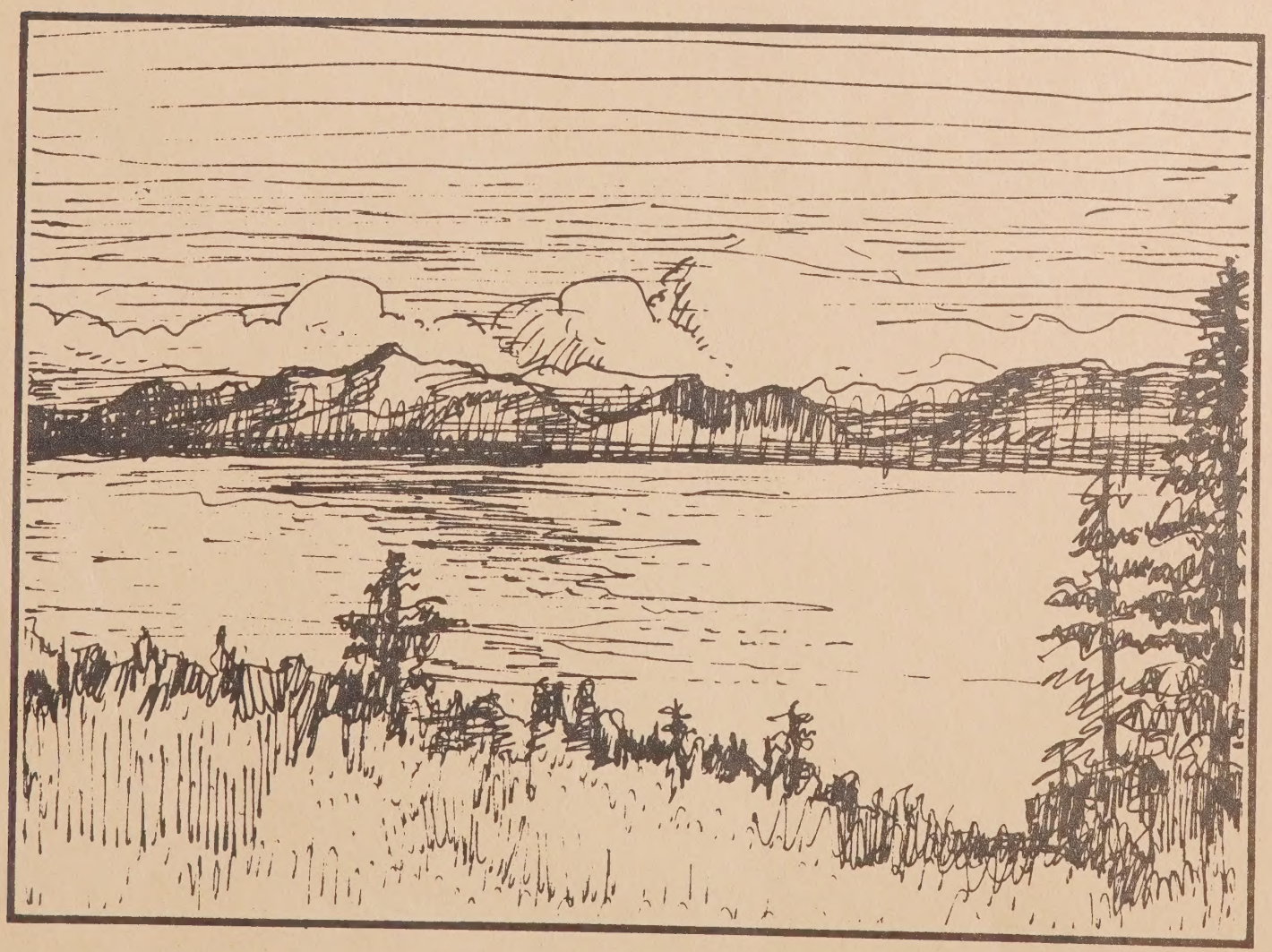
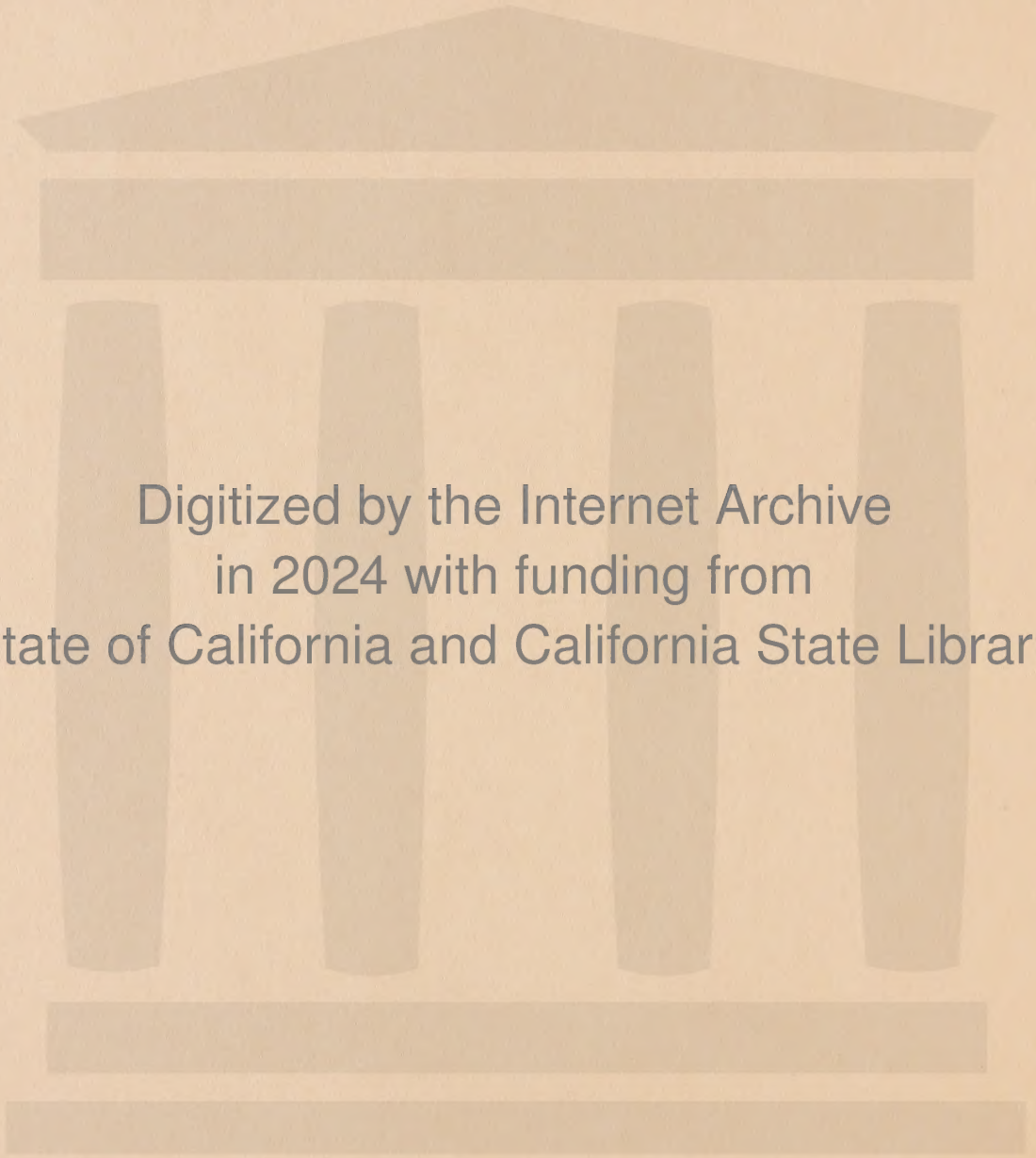
Lake Tahoe Basin Water Quality Management Plan

Draft Environmental Impact Statement



Tahoe Regional Planning Agency



LAKE TAHOE BASIN
WATER QUALITY MANAGEMENT PLAN

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

TAHOE REGIONAL PLANNING AGENCY

FEBRUARY 1981

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SUMMARY

In January, 1981, the newly seated Governing Board of the Tahoe Regional Planning Agency (TRPA) agreed to amend its Lake Tahoe Basin Water Quality Management Plan (208 plan) and implementing ordinances to satisfy the requirements of the California State Water Resources Control Board and Nevada Division of Environmental Protection for certification of the plan for submission to the U. S. Environmental Protection Agency. The proposed amendments would be in effect only until the adoption by TRPA of a new Regional Plan, based on environmental threshold carrying capacities. The revised bi-state Tahoe Regional Planning Compact requires the adoption of an updated Regional Plan by June 19, 1983.

The proposed amendments to the 208 plan and ordinances include restrictions on new subdivisions and on development of stream environment zone and high erosion hazard lands, and would require adherence to land capability coverage limits where development is permitted. They also include commitments to begin implementation of a series of remedial erosion and drainage control projects, an offset policy, and recommendations of specific best management practices for control of water quality problems arising from forest practices and related activities.

This Environmental Impact Statement (EIS) was prepared according to the guidelines in the revised bi-state compact, which establishes an environmental review procedure legally distinct from that of the National Environmental Policy Act. The compact permits an EIS to incorporate by reference detailed information which is readily available to the public in previously published environmental documents and scientific reports. This EIS uses extensive incorporation by reference. It analyzes general impacts which can be expected from implementation of the proposed plan amendments. The specific impacts of individual development proposals and remedial erosion and drainage control projects will be addressed in separate environmental documents as such projects are proposed.

The Tahoe Basin is described in this EIS, with emphasis on water quality and the importance of protecting stream environment zones and high erosion hazard lands. Three basic alternative "projects" are analyzed: 1) the existing TRPA plans and ordinance (no action); 2) the short-term development restrictions and remedial control measures outlined above; and 3) the same restrictions and control measures applied on a permanent basis.

Both positive and negative environmental and socioeconomic impacts of these alternatives are addressed, and mitigation measures are recommended for adverse impacts. It is concluded that the proposed alternative has no significant adverse impacts which cannot be mitigated. The proposed alternative will provide for greater environmental and water quality protection of the Basin than would otherwise occur if only existing plans and ordinances remain in effect. Continued development under existing plans and ordinances will allow a continuing increase in the rate of sediment and nutrient loading to Lake Tahoe. The controls in the proposed alternatives will prevent further increased loadings to Lake Tahoe until the revised TRPA Regional Plan is adopted in 1983.

With vigorous implementation of remedial control measures, net reductions in sediment and nutrient loadings may be possible. Only through permanent implementation of these control measures will substantial loading reductions be possible.

Because the amount of residential and commercial development which may occur in the Tahoe Basin prior to the adoption of a new TRPA Regional Plan is limited by the bi-state compact, and not by the 208 plan, the proposed amendments will have no growth-inducing impacts. The proposed restrictions on commercial and residential construction will direct development to low erosion hazard lands. The development restrictions will affect individual landowners economically; financial and institutional compensation are available through the Santini-Burton Act and a proposed system for transfer of development rights.

Implementation of remedial erosion and drainage control projects will involve temporary environmental impacts such as soil disturbance, noise, dust, and traffic congestion, and will permanently consume energy and resource materials. With soil stabilization and revegetation, the long-term impacts of such projects will be positive.

The first alternative, implementation of existing TRPA plans and ordinances, is concluded to be inadequate to prevent further degradation of the water quality of Lake Tahoe, and it is therefore unacceptable.

The second alternative, the proposed amendments, would provide the minimum control measures necessary to prevent further short-term increases in sediment and nutrient loads to Lake Tahoe. Implementation of this alternative with stricter adherence to the land capability system, and/or with implementation of permanent controls, would provide greater protection.

Permanent controls on development, and a long-term remedial control program, will be developed in the updated Regional Plan. If the states of California and Nevada, find that the permanent controls are inadequate to protect water quality after review of the Regional Plan, they may implement more stringent control measures.

SECTION I. INTRODUCTION

A. Planning Background

In the 1960's, concern about the impacts of development on the environment of the Lake Tahoe Basin, and particularly on the water quality of Lake Tahoe, led to the ratification of the Tahoe Regional Planning Compact by the states of California and Nevada, and by the U. S. Congress. This compact created the Tahoe Regional Planning Agency (TRPA). TRPA adopted a General Plan in 1971. This plan included a Land Use Plan and a land capability system. The land capability system classifies land according to its ability to support development without causing excess soil erosion or water quality degradation. However, the Land Use Ordinance which was adopted to implement the plan did not require strict adherence to the land capability system.

Section 208 of the federal Clean Water Act requires the preparation of regional water quality control plans. Such "208 Plans" must include identification of existing and potential water quality problems, and of necessary control measures. They must also include programs for implementation of control measures, and a commitment to carry out these programs. States or their designated agencies are responsible for preparing 208 plans. All such plans must be certified by the states before submittal to the Environmental Protection Agency. In 1974, California and Nevada jointly designated TRPA as the agency responsible for preparing a 208 plan for the Lake Tahoe Basin.

TRPA issued a draft 208 plan in 1977 which identified five major types of water quality problems resulting from erosion and surface runoff. To correct these problems the plan recommended controls on development in stream environment zones and on high erosion hazard lands, as well as remedial erosion and runoff control measures. The final "Lake Tahoe Basin Water Quality Management Plan" adopted by the TRPA governing board in 1978 accepted the draft plan's assessment of problems, but eliminated several major control measures, and lacked commitment for enforcement of the remaining controls.

The state of Nevada conditionally approved the final TRPA 208 plan, but the California State Water Resources Control Board (SWRCB) rejected it for failure to include the control actions and enforcement commitments which it considered necessary to protect Lake Tahoe. The SWRCB further revoked TRPA's designation as the 208 planning agency for the California portion of the Basin and prepared its own plan. The SWRCB has not yet certified its plan to the Environmental Protection Agency, however. In adopting its final "Lake Tahoe Basin Water Quality Plan" in October, 1980, the SWRCB recognized the desirability of a bi-state plan, and recommended specific changes in the TRPA plan which would result in its certification to the Environmental Protection Agency in the place of the SWRCB plan.

A revised bi-state Tahoe Regional Planning Compact was given final approval by the federal government in December, 1980. The revised compact changes the composition and voting procedures of the TRPA governing board, and directs TRPA to adopt a revised Regional Plan, based on environmental thresholds, by June 19, 1983.

In January, 1981, the new TRPA governing board directed staff to prepare amendments to its 208 plan and ordinances to include prohibitions on development in stream environment zones, on high erosion hazard lands, and in excess of land capability coverage constraints. Furthermore, commitment to begin implementation of remedial erosion and drainage control measures has been strengthened. These controls would remain in effect until the completion of the revised Regional Plan.

All of the planning activities above involved extensive public participation. This Environmental Impact Statement continues the public participation process. When the environmental review process has been completed and the final amendments to the TRPA 208 plan and ordinances have been adopted, the plan will be submitted to the states for certification to the Environmental Protection Agency.

B. Environmental Impact Statement Background

Article VII of the revised bi-state compact establishes an Environmental Impact Statement (EIS) procedure for TRPA which is legally distinct from the mandates of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The compact includes general requirements for the contents of an EIS, but allows TRPA to adopt its own specific guidelines. The latter are still in the process of development.

The compact allows Environmental Impact Statements prepared by TRPA to incorporate by reference "any information or data which is relevant to such a statement and is a matter of public record or is generally available to the public", such as information in an EIS prepared pursuant to NEPA, or an environmental impact report (EIR) prepared under CEQA. The environmental setting of the Tahoe Basin and the environmental impacts of permitting further development, have been discussed in detail in a number of recent reports. This EIS incorporates these reports by reference, cites them extensively in the text, and lists them in a bibliography.

The EIS is focused on analysis of the impacts of controls on the development of fragile lands, and on the implementation of high-priority erosion and runoff control measures, between 1981 and the adoption of a new Regional Plan in 1983.

SECTION II. ENVIRONMENTAL SETTING

A. Geographical Characteristics

Volume III of TRPA's "Lake Tahoe Basin Water Quality Management Plan, entitled "Assessment of Water Quality and Environmental Impacts", contains a description of the topography, climate, geology, and soils of the Lake Tahoe Basin (pages I-1 to I-18). This description is incorporated by reference. Descriptions of the Basin's geographical setting are also contained in CTRPA (1980), WFRC (1979b), Jones and Stokes (1978) Brown and Caldwell (1981), and EPA (1979). The following sections summarize the information presented in greater detail in these references.

1. Setting

The Lake Tahoe Basin is located on the California-Nevada border, between the crests of the Sierra Nevada and the Carson Range. Roughly two-thirds of the Basin lies in California, and one-third in Nevada. The maximum surface elevation of the Lake is 6,229 feet above mean sea level; the surrounding peaks average 2,000 to 3,000 feet above lake level, reaching 10,881 feet at Freel Peak. The physical characteristics of the Basin are summarized in Table 1. (See Figure 1 showing the general geographical location of the Lake Tahoe Basin).

2. Climate

The climate of the Tahoe Basin is characterized by long cold winters and short dry summers. Precipitation comes mainly from Pacific storms and falls primarily as winter snow. Average annual precipitation ranges from over 50 inches on the western side of the Basin to about 25 inches along the eastarn side (Figure 2 is a precipitation map of the Basin). Winter temperatures in the Basin are relatively mild.

Summer weather is characterized by sunny, mostly clear skies, and warm temperatures; most summer precipitation occurs as thunderstorms. Because of the high elevation and cool summer temperatures, the growing season is short, averaging 70 to 120 frost-free days depending on location in the Basin. Micro-climates become more severe with increasing distance from the Lake.

3. Topography

All of the land area in the Basin slopes either toward the Lake, toward one of its tributary streams, or toward its outlet in the lower Truckee River at Tahoe City. Topography determines surface and subsurface hydrology (discussed later in this EIS), air drainage characteristics, and social geography. Cool night air drains down the slopes of the Basin to form a cold air mass over the lake

TABLE 1

PHYSICAL CHARACTERISTICS OF
THE LAKE TAHOE BASIN

Total Surface Area of Basin	501 square miles
Land Surface Area	310 square miles
Elevation of Surrounding Mountains	10,881 feet at Freel Peak
Lake Tahoe:	
Surface Area	191 square miles
Surface Elevation	6,223 to 6,229.1 feet
Length	22 miles
Width	12 miles
Length of Shoreline	71 miles
Maximum Depth	1,645 feet
Average Depth	1,027 feet
Storage Volume (Top 6 feet)	720,000 acre-feet
Total Volume	37.43 cubic miles (126,000,000 acre-feet)

Source: TRPA, 1977

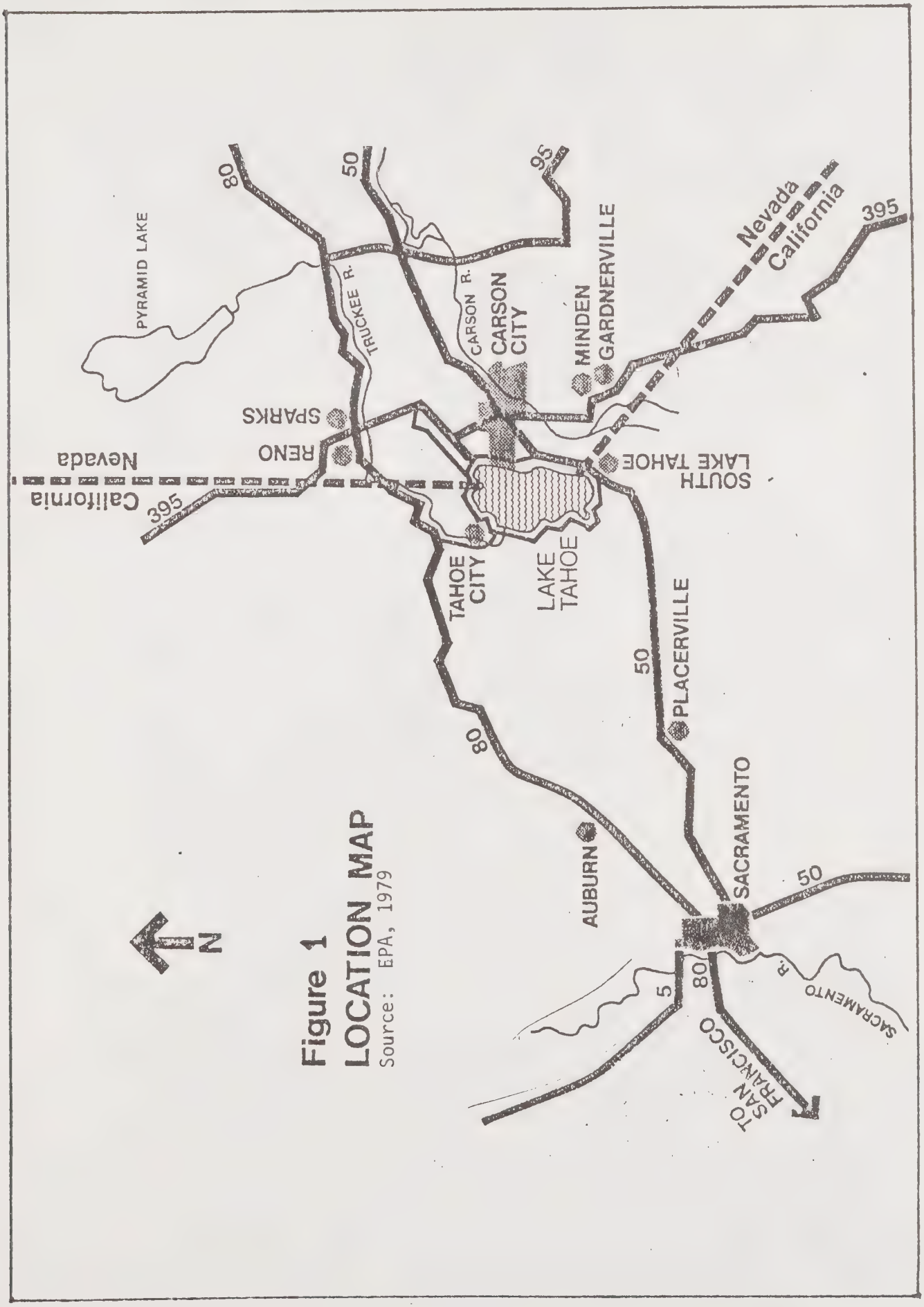
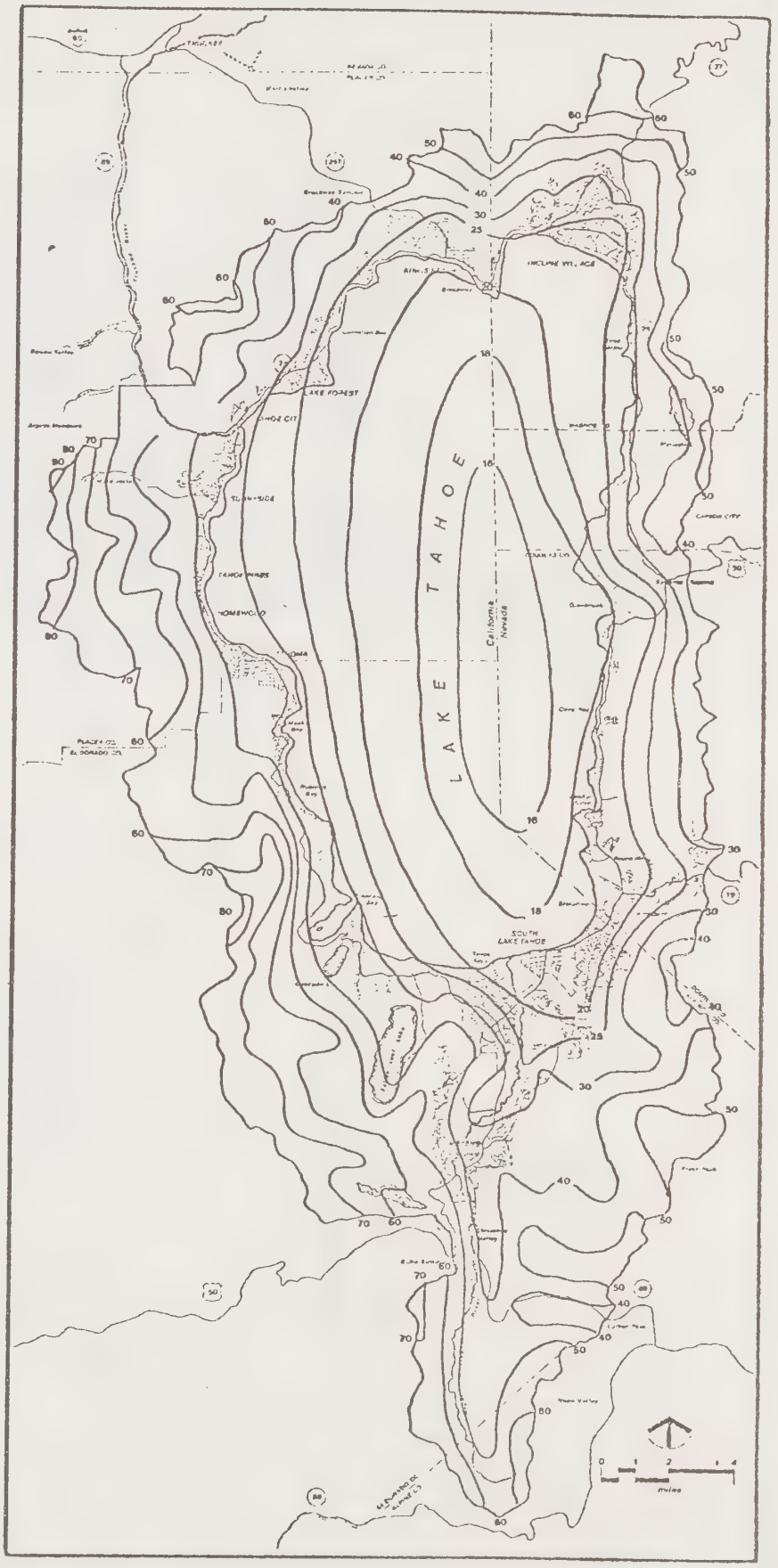


Figure 1
LOCATION MAP
Source: EPA, 1979

Figure 2

Precipitation



Mean Annual Precipitation in the Lake Tahoe Basin (in inches) Oct. 1957-Sept.1977

Source:

Rick A. Lind and James D. Goodridge, Lake Tahoe Water Balance, June 1978. and WFRC, 1979

surface in early morning; such temperature inversions have important implications for air quality. Most of the inhabited areas of the Basin, and major transportation corridors, lie at lower elevations and on relatively gentle slopes near the lake; roads enter the Basin via topographic depressions. The rugged terrain of the Tahoe Basin adds considerably to its recreational and scenic value. Figure 3 is a topographic map of the region.

4. Geology and Geomorphology

Granite rocks underlie the entire Tahoe Basin, and form about half of its exposed rocks. Volcanic deposits cover about one-quarter of the Basin, mainly in the north, and the remaining quarter is characterized by glacial, alluvial, and lake deposits (Brown and Caldwell, 1980). The Basin originated as a graben, a depression formed by movement of the earth between two roughly parallel faults. Five glacial periods have affected the Basin, three of which shaped major landforms on the west and south shores.

The Tahoe Basin is a seismically active area and, although no earthquakes of magnitude greater than 6.0 on the Richter Scale have been reported, the potential for a major shock exists. It is estimated that the Tahoe region should have one shock of magnitude 7.0 or greater every 110 years. The Lake Tahoe area has been included in earthquake intensity Zone III (major), the highest intensity zone in California's Earthquake Epicenters, Faults, and Intensity Zones Map (Jones and Stokes, 1978).

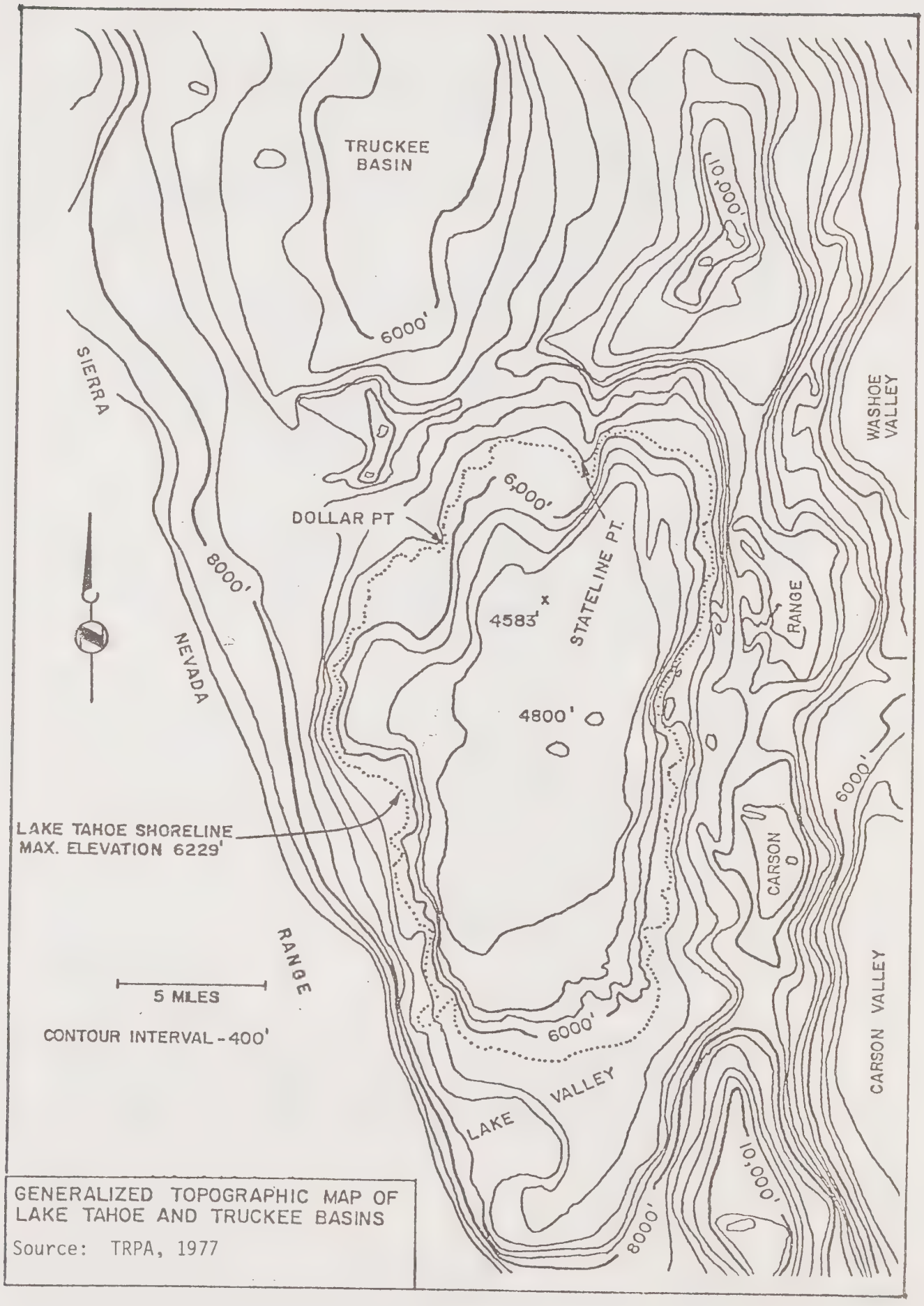
Figure 4 shows the known and approximate locations of faults in the Tahoe area. Areas around fault zones in the Basin are already intensively developed. The most serious natural hazards on the south shore are ground failure, either through liquefaction or lateral spreading, and severe ground shaking (EPA, 1979).

The Lake Tahoe Basin has been divided into six major geomorphic groups as follows (TRPA, 1971):

a. Glaciated granitic uplands
b. Glaciated volcanic flowlands
c. Streamcut granitic mountain slopes
d. Streamcut volcanic flowlands
e. Depositional lands
f. Oversteepened slopes.

These geomorphic groups are relatively large areas of land that have similar characteristics and serve to delineate the permanent elements of the ecosystem. A number of closely related landforms exists within each major group. A more complete discussion of these geomorphic groups is described in "Geology and Morphology

Figure 3



GENERALIZED TOPOGRAPHIC MAP OF LAKE TAHOE AND TRUCKEE BASINS

Source: TRPA, 1977

Figure 4


REGIONAL FAULTS
KNOWN LOCATION
APPROXIMATE LOCATION
CONCEALED
Source: EPA, 1979
WASHOE COUNTY
CARSON CITY
DOUGLAS CO
PLACER COUNTY
EL DORADO COUNTY
CARSON VALLEY
LAKE TAHOE
EMERALD BAY STATE PARK
D.L. BLISS STATE PARK
DESOLATION WILDERNESS
NEVADA
CALIFORNIA
Crystal Bay
Incline Village
Sand Point
Glenbrook
Zephyr Point
Genoa
Carson City
Lake Forest
Tahoe City
Homewood
Chambers Lodge
Tahoe Pines
Sunnyside
Tahoe Vista
Brockway
Meeks Bay
Mottsville
Centerville
Minden
Stockyards
Douglas County
Hot Springs Mountain
Eagle Valley
Washoe Valley

of the Lake Tahoe Basin, a Guide for Planning" prepared by the TRPA and the U. S. Forest Service (TRPA, 1971a). The geomorphic setting is further described in "Land-Capability Classifications of the Lake Tahoe Basin, California-Nevada, A Guide for Planning", also prepared for the TRPA and the U. S. Forest Service (Bailey, 1974). Land capability classification with associated coverage constraints are also assigned to the various geomorphic units in the latter document.

5. Soils

The characteristics of Tahoe Basin soils are closely related to the granitic, volcanic, or alluvial parent materials. Most soils are geologically young and poorly developed; they have not been greatly modified by organic matter from vegetation. Many are coarse in texture, with low cohesion and low water-holding capacity, making the establishment and maintenance of vegetation difficult, and erosion potential high. Six major soil groups have been identified in the basin (TRPA, 1971b) and soil characteristics have been used in the development of the land capability system.

A total of 30 different specific soil types have been identified, described and mapped by the U. S. Soil Conservation Service and U. S. Forest Service (SCS, 1974). The sensitivity to development of the various soil types is further described in the "Land Capability Classification of the Lake Tahoe Basin, California-Nevada, A Guide for Planning" (Bailey, 1974), which groups these soil types into seven different classifications of sensitivity and assigns a coverage constraint to each class.

6. Land Capability

The following discussion is taken primarily from the "Land Capability Classification of the Lake Tahoe Basin", (Bailey, 1974), which is incorporated by reference into this EIS:

Land capability is defined as the level of use an area can tolerate without sustaining permanent damage through erosion and other causes. Although capability classes are expressed as levels of tolerance, they are estimated by the degree to which potential hazards use are absent. (The lower erosion hazard an area has, the higher its capability rating for development). The classification is an interpretive grouping of kinds of land, made primarily for the purposes of erosion control and maintaining ecological balances.

The inherent or natural resistance of the surface soil to water erosion independent of vegetation and surface litter is termed erosion hazard. Sediment discharge from watersheds is significantly related to degree of resistance. Where vegetation and surface litter are depleted to less than the minimum density required to protect the soil, sediment yields from relatively small areas may increase tremendously. The increase is proportional to the amount of soil laid bare and to the inherent erosion hazard of the soil.

The erodibility of a soil is a fixed property, and there is little possibility of changing it. Soils also have an inherent infiltration capacity. Where impervious surfaces concentrate rainfall and runoff beyond the infiltratation capacity of the areas left undisturbed, the resulting overland flow causes sheet, rill and gully erosion. Soils must be managed with these qualities in mind, and the level of use adjusted accordingly. Soils with high erodibility or high runoff potential must be left undisturbed or used with the greatest care.

Soils within the highly variable Tahoe Basin differ greatly in their natural resistance to erosion. Erosion is proceeding so slowly in some areas that soil is being formed and accumulated more rapidly than it is being removed. Streams from such areas carry only negligible loads of sediment. In other areas, climatic and geologic conditions limit soil formation, plant growth and fixing of land surface. From these drainages, runoff has always been rapid and erosion pronounced, giving rise to turbid and highly fluctuating streams. Between these extremes are areas showing all gradations of runoff and sedimentation rates.

Disturbance of watersheds with unstable soils by housing construction, logging or intensive grazing, increases erosion rates from 12 times (as found in Glancy, 1977) to 100 times (White and Franks, 1978) above the rate of undisturbed areas, whereas disturbance of the more stable soils causes variation by only a factor of two (California Resources Agency, 1969). Development constructed according to land capability has been shown to result in only 2-3 fold increases in sediment yield rates above pre-development conditions (White and Franks, 1978).

The California State Water Resources Control Board's "Lake Tahoe Basin Water Quality Plan" (SWRCB, 1980) contains an evaluation of existing water quality data and land capability of tributary watersheds. This evaluation indicates that the degree of water quality deterioration, as measured by suspended sediment loading, is closely related to the extent of soil disturbing activities in a watershed which take place in excess of land capability coverage constraints.

Slope (length and shape) and climate are evaluated and integrated with soil erodibility to describe an inherent erosion hazard. The evaluation of the hazard factors allows establishment of classes of varying degrees of tolerance to land development. The potential impact of land use and therefore the required protection is a function of both the tolerance of an area and the characteristics of the proposed development. Thus, the type and intensity of use and management that are suitable for land in each of the capability classes can theoretically be determined by combining the index values for land tolerance and development stress. Using this approach, the implications of the seven hazard classes were considered in relation to a broad range of prospective land uses.

The range in the seven classes extends from land capable of tolerating a high degree of disturbance without permanent damage to water quality or land productivity (class 7) to land that should remain in its natural condition but may be suitable for wildlife, dispersed recreation, or protection of watersheds (class 1). The seven capability classes are further grouped into three broad categories according to the relative risk of land damage (disturbance hazard.) Table 2 summarizes the basis for capability classification of Tahoe Basin lands. Table 3 lists the acreage of land in each class.

High hazard lands (classes 1 and 2) are characterized by steep slopes and a fragile environmental balance, with unique plants and animals. They also have scenic value as backdrops and foregrounds for surrounding areas. These should remain generally in their natural condition. To be suitable, uses of these lands should allow for protection and improvement of visual, wildlife and watershed values. Access facilities should be restricted generally to foot and horse trails. Recreational use will need to be dispersed and generally limited to hiking, backcountry camping and fishing. These lands should be managed such that intensive commercial resource use is not permitted.

Moderate hazard lands (class 3 and 4), characterized by moderately steep mountain slopes, will allow certain uses but not others. Often they provide visual backdrops for low hazard areas. Access should be by low standard roads and trails. Recreation use may be varied and concentrated, including campgrounds, picnic areas and winter sports sites. Low-density housing may be permitted on occasion, as well as limited harvest of forest products. The high runoff potential of class 3 lands requires that any development of these areas be kept to a very low density.

Low hazard lands (class 5 thru 7) are areas of gently sloping foothills and plains with deep soils. They are generally suitable for various development activities as well as for concentrated public occupancy. Access should be by high-standard roads and trails. This land may support most kinds of intensive or mass recreational use if developed judiciously. Usual facilities include campgrounds, organizational camp sites, recreational residences, hotels and resort or other commercial services. Limited commercial resource use is appropriate where it does not tend to destroy other values.

TABLE 2

Basis of Capability Classification for Lake Tahoe Basin Lands

Capability levels	Tolerance for use	Slope percent[1]	Relative erosion potential	Runoff potential[2]	Disturbance hazards
7	Most	0-5	Slight	Low to moderately low	
6		0-16	Slight	Low to moderately low	Low hazard
5		0-16	Slight	Moderately high to high	
4		9-30	Moderate	Low to moderately low	Moderate hazard lands
3		9-30	Moderate	Moderately high to high	
2		30-50	High	Low to moderately low	
1a	Least	30+	High	Moderately high to high	High hazard lands
1b		Poor natural drainage[3]			
1c		Fragile flora & fauna[3]			

[1] Most slopes occur within this range. There may, however, be small areas that fall outside the range given.

[2] Low to moderately low - hydrologic-soil groups A and B; moderately high to high-hydrologic-soil groups C and D.

[3] Areas dominated by rocky and stony land.

Source: Land Capability Report, Bailey

TABLE 3

Lake Tahoe Basin Land Area Classified by Capability

Land capability class	Total Area		National Forest Land	
	Acres	Percent	Acres	Percent
7	3,030	2	101	1
6	8,800	4	1,144	1
5	16,730	8	4,878	4
4	7,050	4	1,421	1
3	12,900	6	3,471	3
2	4,770	2	2,012	2
1	148,750	74	102,266	88
Total	202,030	100	115,594	100

Source: Land Capability Report, Bailey

To transform the limitations on land-surface modifications for each land capability class into a single numerical index that characterizes development capacity, each class is assigned a numerical value representing the percentage of each area that can be used for impervious cover if environmental balance is to be maintained. Allowable land coverage by capability class is as follows:

Capability Class	Allowable Percentage of Impervious Cover
7	30
6	30
5	25
4	20
3	5
2	1
1	1

Impervious surface is defined to include all disturbed areas.

Control of impervious surface alone does not solve all environmental problems. It is deemed, however, to be the most critical element in the land disturbance that has created the basic environmental problems facing the Lake Tahoe basin - water quality degredation, flooding and soil erosion. It is also considered the most accurately measurable and constant expression of development impact.

B. Land Use and Planning

1. Existing Land Use Plans

Entities with responsibility for different aspects of land use planning in the Basin include the federal government (mainly the U. S. Forest Service), the states of California and Nevada, the Tahoe Regional Planning Agency, the California and Nevada Tahoe Regional Planning Agencies, Placer and El Dorado counties in California, Washoe, Douglas and Carson City counties in Nevada, and the City of South Lake Tahoe. The Environmental Protection Agency's EIS (1979) and the SWRCB's Lake Tahoe Water Quality Plan (SWRCB, 1980) summarize the responsibilities of other agencies whose activities affect the Tahoe Basin's environment.

The TRPA General Plan, adopted in 1971, includes a Land Use Plan. The plan makes use of the land capability system discussed in the previous section of this chapter. The TRPA Land Use Ordinance adopted to implement the 1971 General Plan did not require strict adherence to the land capability system, allowing excess coverage in certain situations, and permitted construction of one home on each lot in any existing subdivision, regardless of land capability.

In approving the original bi-state compact, California and Nevada established separate state regional planning agencies with authority over each state's portion of the basin. The Nevada Tahoe Regional Planning Agency has jurisdiction only over proposals for casino development. The California Tahoe Regional Planning Agency (CTRPA) initially limited its review to public works projects but, because of dissatisfaction with actions taken by TRPA, CTRPA was given additional authority by the California Legislature in 1973.

In 1975, CTRPA adopted a Regional Plan which set stricter land use controls than those established by TRPA. The CTRPA plan and ordinances set stricter coverage limits, and allowed fewer coverage overrides than the TRPA regulations, but did not require strict adherence to the land capability system. They also allowed construction of one home on each lot, regardless of land capability (SWRCB, 1980). In November, 1980, CTRPA approved a Regional Plan update which contains a number of actions designed to prevent further deterioration of water quality of Lake Tahoe and to protect valuable habitats. The principal actions are as follows:

- elimination of overrides to the land capability system coupled with the requirement that further development proceed strictly within the coverage constraints prescribed by that system as calculated on the basis of the parcel boundaries (i.e., excluding coverage of local roads).

- imposition of a temporary prohibition on development of land capability classes 1, 2, and 3, and stream environment zones.

A random selection process will be employed for single family development to be administered by local government, if they so desire, where each vacant lot owner can submit a development application. Allocations for lots within land capability districts 4 through 7 and not within SEZ's may submit development applications. Allocations for lots within land capability districts 1 through 3 or SEZ's will not be allowed to build. They will be given the opportunity to transfer their development rights to a higher capability lot (Class 4 - 7), to sell them to the owner of such a lot, or to sell their lot, plus development rights, to a state or federal agency. In order to relieve potential inequity and hardship that would otherwise burden owners of land made unbuildable through these restrictions, the plan includes a "transfer of development credit" system which ensures that unbuildable lots still have substantial value. The plan also adopted the concept of limiting the amount of development approved annually and tying that amount to environmental thresholds and urban-service system capacities. The plan also continued CTRPA's existing moratoriums against new subdivisions and development of multi-family residential developments (other than affordable housing units or those constructed pursuant to a development credit transfer).

Much of the land zoned for urban use within the Tahoe Basin has not been subdivided or otherwise committed to development. Table 4 shows the amount of land currently being used for various purposes and the amount of land which will be devoted to those purposes if all areas zoned for urban use by the TRPA and CTRPA Regional Plans are developed. The Regional Plans of the two agencies at this time set the same land use district boundaries, although CTRPA anticipates zoning revisions.

Articles V and VI of the revised bistate compact direct TRPA to prepare and adopt a new Regional Plan and ordinances, based on environmental threshold carrying capacities. The new plan is to include land use, transportation, conservation, recreation, and public services and facilities elements. The plan must provide for the attainment and maintenance of the strictest applicable federal, state, or local air and water quality standards, and TRPA is empowered to adopt even more stringent standards. Each element of the plan must contain provisions and time schedules for implementation by agency ordinances. The TRPA must make specific findings that any project which it approves will not cause its environmental threshold carrying capacities to be exceeded. The TRPA must prepare a detailed EIS for any project which may have a significant effect on the environment.

Article VI of the revised compact establishes partial moratorium on development in the Basin until the adoption of the new Regional Plan or until May 1, 1983, whichever is earlier. Until that time, there are to be:

a. No new subdivisions, planned unit developments or condominium projects, except for certain property owned by the Round Hill General Improvement District.

b. No building permits for new single family dwellings or other residential units in numbers greater than were authorized by each county or city during calendar year 1978. Development is limited to 1,078 units per year in California and 530 units per year in Nevada. No new apartment buildings are allowed except those permitted within these limitations.

c. No building permits for new commercial construction of a greater square footage than was authorized in each county or city in calendar year 1978. This amounts to 87,324 square feet of new commercial space in California, and 107,954 square feet in Nevada.

TABLE 4

LAND USE and ZONING in LAKE TAHOE BASIN *

LAND USE DISTRICT	EXISTING LAND USE (Acres)	GENERAL PLAN (Acres)
Rural Estates	2,488	2,337
Low Density Residential	13,308	19,198
Medium Density Residential	1,626	1,504
High Density Residential	1,074	2,270
Medium Tourist Residential	3	3
Tourist Commercial	1,024	1,320
General Commercial	1,123	1,503
Recreation	2,207	4,328
Public Service	727	898
Conservation Reserve	–	1,753
General Forest	174,538	163,004
BASIN TOTAL	198,118	198,118

* Source: Tahoe Regional Planning Agency (1977).

The compact also includes specific provisions restricting construction or expansion of sewage treatment facilities, highways, parking garages, and gaming facilities. The partial moratorium sets the maximum amount of development which may be permitted. The compact allows TRPA to set stricter controls.

On October 15, 1980 President Carter issued Executive Order 12247 directing federal executive agencies to give special consideration to the environmental effects of their proposed actions in the Lake Tahoe Region. The executive order establishes an interagency committee known as the Tahoe Federal Coordinating Council. The purpose of the Executive Order is "to ensure that federal agency actions protect the extraordinary natural, scenic, recreational, and ecological resources in the Lake Tahoe Region (as defined by Public Law 91-148), an area of national concern...". The Coordinating Council will review all federal activities which may adversely affect the Tahoe environment, and cooperate with TRPA in determining environmental threshold carrying capacities for the Basin (WFRC, 1981).

2. Public Services

a. Wastewater Treatment

Wastewater treatment has had an important influence on planning and land use in the Tahoe Basin. Until the late 1960's, wastewater was discharged to land by small community treatment systems or individual septic tank-leachfield systems. Nutrients from this wastewater reaching Lake Tahoe and its tributaries via groundwater were implicated in an increase in algal productivity in the lake. In response to this concern, California and Nevada mandated the export of sewage from the Basin. Completion of systems for the treatment and export of sewage from the Basin has eliminated most of the threats to Lake Tahoe from domestic wastewater; however, a few problems remain. As identified by the SWRCB Water Quality Plan, these include migration of nutrients from the unlined Douglas County Sewer Improvement District No. 1 oxidation pond, raw sewage overflows, exfiltration from sewer lines, isolated development not yet connected to sewer lines, and migration of nutrients from abandoned leachfields and land disposal areas.

The sewering of the Tahoe Basin may well to have contributed to increased erosion and surface runoff, by permitting development on steep slopes and shallow soils which would not be suitable for septic tanks. Today, wastewater treatment capacity is a constraint to development in the Basin. Several of the region's treatment facilities are at or near capacity. The Tahoe-Truckee Sanitation Agency, which serves the north and northwest shores in California, has recently approved plans for the expansion of its treatment plant, but has committed itself

not to serve new development within the Tahoe Basin which would be prohibited by the SWRCB Water Quality Plan or the CTRPA Regional Plan. The South Tahoe Public Utility District and Douglas County Sewer Improvement District, which serve the south shore, are also seeking to expand and/or upgrade their treatment facilities. Concern for the potential impacts of such expansion on the environment of the Basin and adjoining areas led the Environmental Protection Agency to prepare a detailed EIS (EPA, 1979), which concluded that expansion would have many significant adverse environmental impacts. A task force including the wastewater treatment agencies, and state, regional, and local governments has been meeting with EPA to negotiate a package of acceptable mitigation measures.

The partial moratorium in the revised bi-state compact also addresses wastewater treatment facilities. During the moratorium period, no sewage facilities within the Basin may be constructed or enlarged except to comply with state and federal water pollution control laws, to accommodate development which is not prohibited or limited by the moratorium, or to upgrade the Douglas County SID facility to enable it to treat the flows for which it was designed.

b. Water Supply

Water use in the Tahoe Basin is limited by the California-Nevada Interstate Compact. Although ratification by Congress is still pending, the Interstate Water Compact has been accepted by both states as the only comprehensive basis available for allocating water rights in the Tahoe Basin. The compact limits water use in the California portion of the Basin to 23,000 acre-feet per year (afa), and in Nevada to 11,000 afa.

The revised Tahoe Regional Planning Compact specifically provides that no provision of that compact "shall have any effect upon the allocation, distribution, or storage of interstate waters or upon any appropriative water right".

Water for consumptive use in the Lake Tahoe Basin is withdrawn from Lake Tahoe, small lakes, streams, and groundwater sources via 93 separate water supply systems. Because all of the water sources are high quality, very little, if any, treatment is required. More than half of all water use occurs in the south shore area, but water use in the Incline Village and Crystal Bay areas of the north shore has been increasing rapidly. Seasonal variations in water use are substantial (WFRC, 1979).

The California SWRCB completed a "Study on Water Use and Water Rights, Lake Tahoe Basin" in 1979. This study identified problems with capacity and distribution for many small water systems on the California side of the Basin, and concluded that if existing subdivisions are built out, annual water

use on private lands will exceed the quantity legally available for use in the Lake Tahoe Basin unless consumption per household is reduced to levels below the 1974-1977 average. The report also estimates that it is unlikely that there will be enough water available to support development in Nevada beyond buildout of existing subdivisions. A TRPA staff report concludes the Incline Village General Improvement District will exceed its present water rights allowance if all parcels in existing subdivisions within the district are built out.

c. Solid Waste Disposal

Detailed discussions of solid waste disposal in the Basin are included in WFRC (1979), EPA (1979) and SWRCB (1980).

California and Nevada both prohibit the disposal of solid waste within the Tahoe Basin. Waste from the South Shore is exported to the Douglas County Landfill near Gardnerville, Nevada; the North Tahoe Landfill near Truckee serves the California North Shore; and the Carson City Landfill serves the North Shore of Nevada. The North Tahoe Landfill is expected to reach capacity by 1984, and alternatives are being studied.

The Tahoe Basin Association of Governments, a voluntary association of the cities and counties in the Basin, is conducting a study on the feasibility of alternative solid waste disposal methods. These include an incinerator facility which could meet air quality standards and generate energy for use in the Basin, and a single large transfer station to receive all Basin wastes, which would be shipped to Carson Valley for incineration, resource recovery, or landfill.

d. Energy

The Sierra Pacific Power Company (SPPC) service area includes all of the Tahoe Basin. Peak loads are approximately equal to reliable capacity of the distribution system. SPPC is proposing a master plan calling for additional transmission lines to increase the system's reliable capacity.

California-Pacific Utilities Company (CPUC) supplies parts of Douglas County and most of the City of South Lake Tahoe with natural gas. The Southwest Gas Corporation supplies natural gas to most of Placer County. These systems appear to be capable of meeting peak demand for some time into the future.

e. Transportation

The following discussion is taken from CTRPA (1980b), pages V-70a to V-72:

Existing transportation facilities of the Basin consist of a highway network, local and intercity public transportation, and two airports (Figure 5). The geography of the Basin tends to channel most travel into the highway corridors. Mass transit systems include bus lines on the north and south shores, dial-a-ride and shuttle systems, and limited waterborne transit across the lake. The CTRPA report summarizes current problems and planning activities related to transit.

Roads entering, and major corridors within, the Basin are near or have already reached their practical capacity. Normal growth within the Basin and additional day use will compound the existing congestion problem. The detrimental environmental impact of an extensive road system within the Basin's fragile environment precludes expansion of the auto/highway system. Most of the significant immediate problems in the region are interrelated with transportation. Basin air quality regularly violates state and federal carbon monoxide standards due to auto emissions. Runoff associated with roadways and parking lots contributes to water quality degradation. Transportation-related noise is an increasing concern. Traffic congestion is severe and still growing worse. CTRPA's 1980 plan update (CTRPA, 1980a) emphasizes increased public transportation rather than expansion of the highway system as the solution to traffic problems.

The revised Tahoe Regional Planning Compact provides: "The goal of transportation planning shall be:

(a) To reduce the dependency on the automobile by making more effective use of existing transportation modes and of public transit . . . and

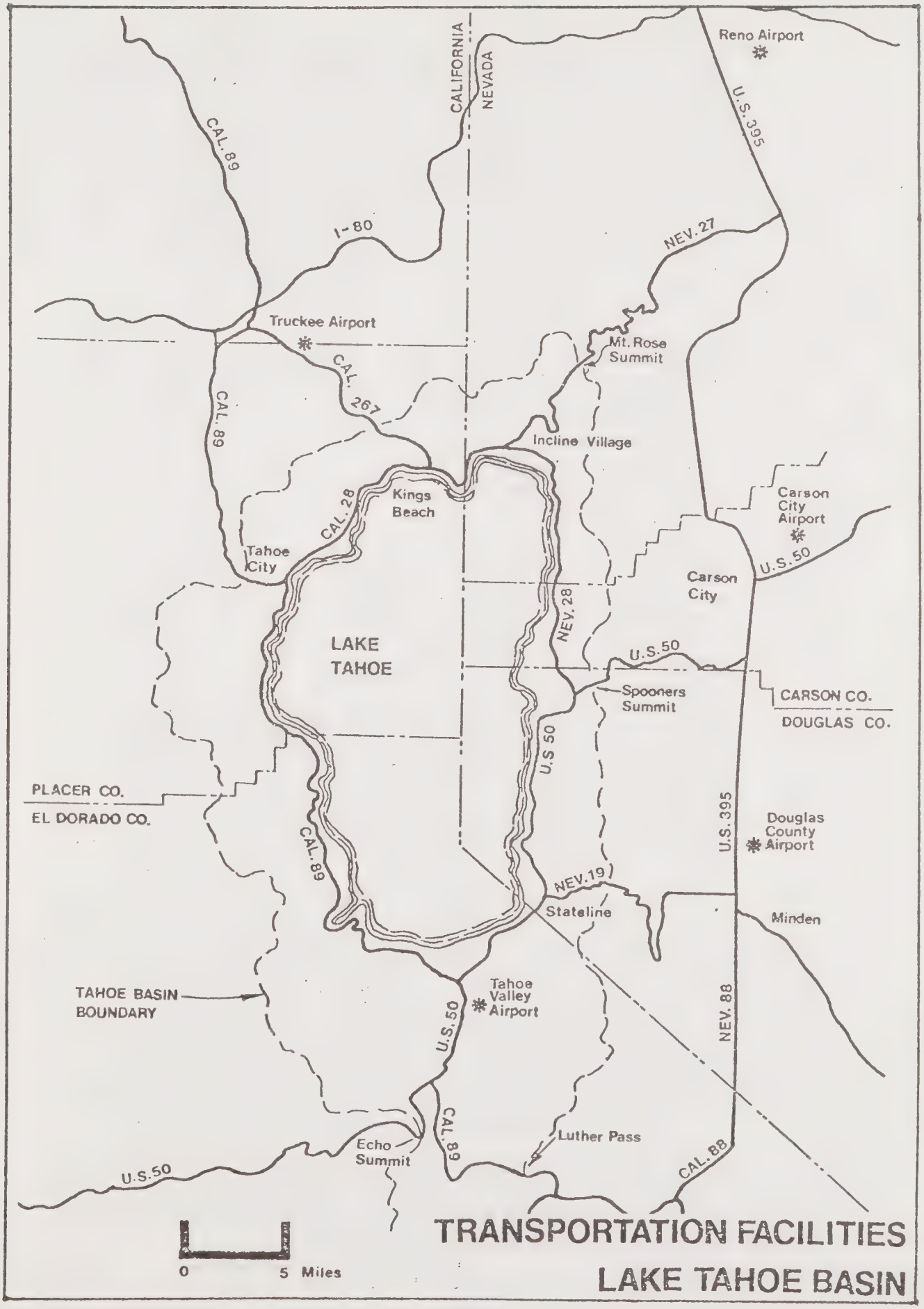
(b) To reduce to the extent feasible air pollution which is caused by motor vehicles.

Where increases in capacity are required, the agency shall give preference to providing such capacity through public transportation . . ." The revised bi-state compact (Article IX) also establishes the Tahoe Transportation District to include the entire Basin. The district is authorized to own, operate, and propose taxes to be submitted to the voters of the district for the financing of public transportation systems.

f. Other Public Services

The following discussion of existing conditions for other public services, including schools, police and fire protection, and

Figure 5



Source: EPA, 1979

health care, is taken from the Lake Tahoe Environmental Assessment (WFRC; 1979; p. 100) which is incorporated by reference.

El Dorado County, Placer County, the City of South Lake Tahoe, Carson City, Douglas County, and Washoe County are responsible for land-use planning and zoning, building inspections and permits, public works, public and environmental health services, community development, and local parks and recreation within their respective jurisdictions. Additionally, a multitude of special purpose districts provide health, education and police and fire protection services. Community facilities for providing these services have the capacity to meet existing demand.

Barton Hospital, located at the south shore, and Tahoe Forest Hospital, located outside of the Basin in Truckee, serve the Lake Tahoe Basin. Barton Hospital has 62 licensed beds and 28 unlicensed bed available during peak summer periods. Tahoe Forest Hospital has 42 licensed beds. Using a standard of two beds per 1,000 people, the capacity of the Barton Hospital was exceeded about 25 days in 1976. Average use of the Tahoe Forest Hospital was 36 percent of capacity in 1976.

Five school districts serve the educational needs of the Basin: The Lake Tahoe Unified School District, the Tahoe-Truckee Unified School District, the Douglas County School District, the Washoe-Incline Village School District, and the Lake Tahoe Community College District. Student-teacher ratios range from 16:1 to 25:1 to 1, indicating no overcrowding now. All school districts have additional capacity.

Police protection is provided by the City of South Lake Tahoe and El Dorado, Placer, Douglas, and Washoe Counties Sheriff Departments. The City of South Lake Tahoe reports a 35 percent crime increase from 1970 to 1977 (2,173 to 2,933 crimes). Washoe County records indicate a 46 percent increase in crime from 1975 to 1978 (784 to 1,145 crimes). The major crimes are burglary, robbery, larceny, and assault, with crime peak periods corresponding to peak visitation in summer and winter.

Fire protection is provided by five departments in California, three in Nevada, and by the Forest Service. Fire protection service is adequate in most areas. A few areas have an inadequate number of fire hydrants or inadequate flow rates. Fire hydrants are inadequate near Rubicon Bay and a few areas on the north shore. The outlying parts of the City of South Lake Tahoe and Tahoe City experience inadequate flow rates. In these areas, the recommended 750 to 1,000 gallons per minute (gpm) flow rates for rural residences are not being met. Additionally, the 800 to 900 gpm hydrants near the South Lake Tahoe schools do not meet the recommended standard of 1,000 gpm.

Local revenues have traditionally equaled or exceeded expenses for these services. Local revenues were $104 million in 1977, and most communities are planning new facilities.

C. Population, Housing, and Economy

The existing characteristics of the Basin's population, housing, and economy are extensively reviewed in the Lake Tahoe Environmental Assessment (WFRC, 1979, pgs. 44-54 and 75-82). These documents are incorporated by reference. This discussion is excerpted and summarized below:

1. Population

In the Lake Tahoe Basin, two major categories of population are generally recognized - residents, including permanent and seasonal residents, and visitors, including gaming and outdoor recreationalists as well as second home owners. The growth in the resident and visitor population in the summer at Tahoe is shown in Table 5 and Figure 6. Table 6 presents population data for 1980. Both the resident and visitor population increased steadily since 1970, and the rate of increase was greater between 1974 and 1978 (9.6 percent per year compounded) than between 1970 and 1974 (8.6 percent per year compounded). Between 1970 and 1978, the Basin resident population increased by an average of 4,950 people per year, while the visitor population increased by an average of 4,830 people per year. Overall, the Basin's summer population increased 97 percent between 1970 and 1978. The total summer population of the Basin is now about 159,200 on an average summer day and 223,300 on a peak summer day. Total winter population averages half of the summer population with tourism dropping by two-thirds in the winter.

The major urban centers in the Lake Tahoe Basin are all located along Tahoe's shoreline. The City of South Lake Tahoe is by far the largest of the urban areas, containing 44 percent of the resident population. The Incline Village area, on the north shore, has been growing very rapidly over the last 5 years; most Washoe County, Nevada residents live there. Similarly, most Douglas County, Nevada residents live in the Stateline area of the south shore. Nearly the entire shoreline in Placer County, California is developed with the largest city being Tahoe City. Overall, about 80 percent of the residents live in California and 20 percent in Nevada.

2. Housing

The housing stock in the Lake Tahoe Basin is comprised of single and multifamily dwelling units occupied by permanent and seasonal residents and by second home owners. Housing growth has occurred in response to an expanding job market associated with recreational facilities and in response to rising demands for second homes. Housing in Lake Tahoe is described here, historically, in terms of quantity, type, location, cost, occupancy rates, and adequacy.

a. Quantity, Type, and Location

Table 6 gives the number and type of dwelling units in each state in 1980. Between 1970 and 1978, the total housing stock increased 1.8 times from 20,263 to 36,043 dwelling units. The rate of increase was 6.5 percent per year between 1970 and 1975, increasing to 9.4 percent per year between 1975 and 1978.

Table 5: Population of the Lake Tahoe Basin in the Summer

	1960	1970	1974	1978
Resident Population	14,860	33,600	46,760	73,200
Visitor Population				
Average Day	U	47,400	63,980	86,030
Peak Day	U	105,300	119,800	150,120
Total Population				
Average Day	U	81,000	110,740	159,230
Peak Day	U	138,900	166,560	223,320

U = unknown

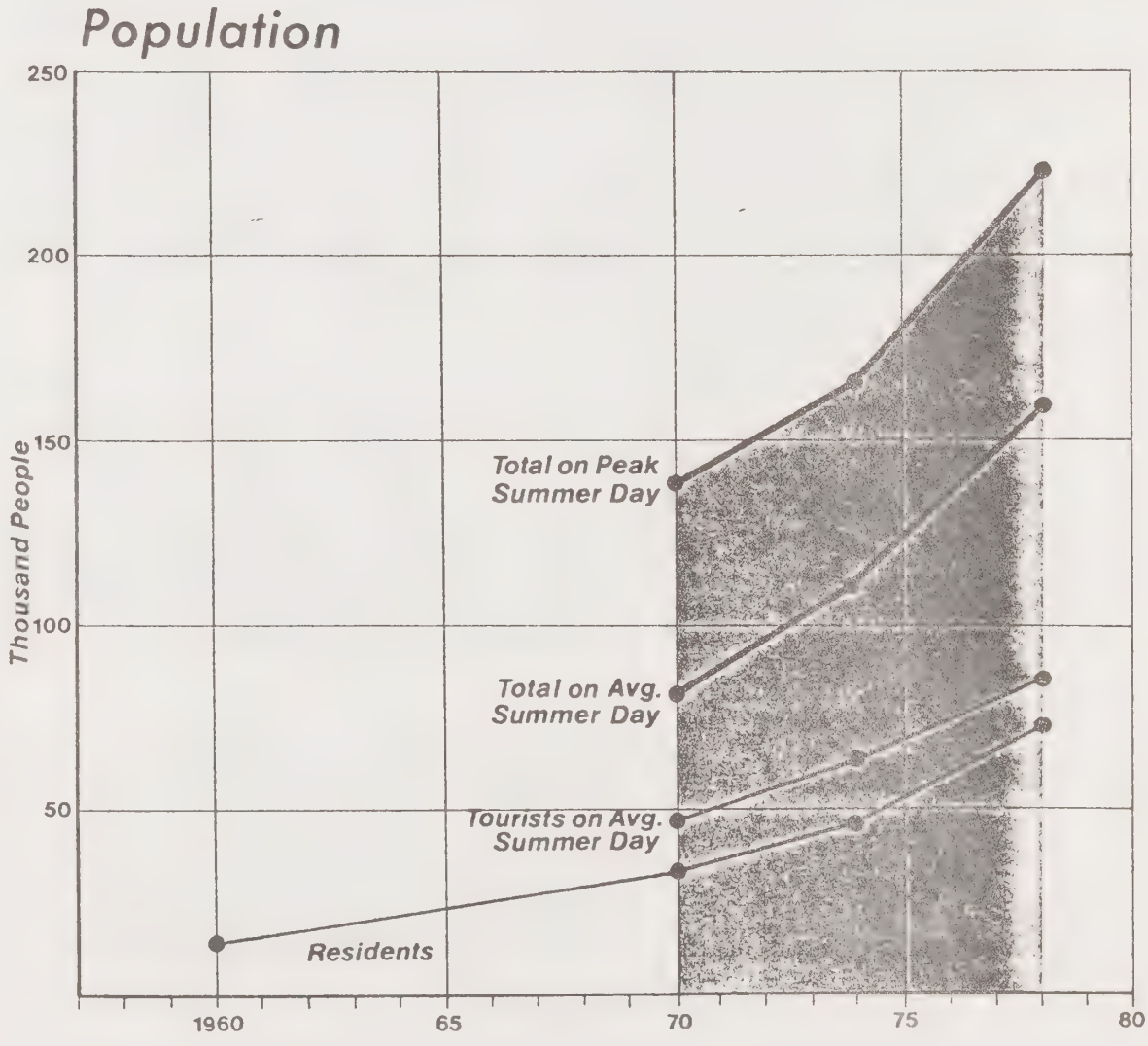


Fig. 6.. Population of the Lake Tahoe Basin During the Summer.

SOURCE: EPA, 1979

TABLE 6

1980 POPULATION AND HOUSING[1]

1980 Average Summer Population[2]

JURISDICTION	
CALIFORNIA	
• City of South Lake Tahoe	50,700
• El Dorado Co.(unincorporated)	20,600
• Placer County	25,900
• South Tahoe PUD	65,800
• Tahoe-Truckee S.A.	31,400
TOTAL -California side	97,200
NEVADA	
• Douglas County	13,600
• Washoe County	13,500
TOTAL -Nevada side	27,100
BASIN TOTAL	124,300

DWELLING UNIT TYPE	
CALIFORNIA	
• Single Family[A/]	22,010
• Multiple Family[B/]	9,020
• Tourist[C/]	10,880
TOTAL	41,910
NEVADA	
• Single Family[A/]	4,900
• Multiple Family[B/]	5,300
• Tourist[C/]	3,000
TOTAL	13,200
TOTAL BASIN	
• Single Family[A/]	26,910
• Multiple Family[B/]	14,320
• Tourist[C/]	13,800
TOTAL	55,110

[1] Source: SWRCB, 1980, pg. 215, 222

[2] Does not include day use. Includes residents and overnight visitors only.

A/ Includes: single family dwelling structures only.

B/ Includes: duplex, triplexes, fourplexes, apartments, condominiums, and mobile homes.

C/ Includes: hotels, motels, and campgrounds.

Multifamily units are clustered in three areas - Incline Village, Tahoe City, and South Lake Tahoe - while residential units occur all along Lake Tahoe's shoreline.

The vast majority of dwelling units are in California (79 percent in 1975), but Nevada's share has been increasing. Since 1976, the number of residential units permitted each year in California decreased from 1,949 to 667, primarily because of sewer connection bans. In contrast, the number of permits issued each year in Nevada increased in the same period from 496 to 1,111.

While the most significant growth has been in multifamily dwellings in Nevada, single-family dwellings still comprise the predominant type of housing, (72 percent in 1970 and 65 percent in 1978). Seasonal and second home units comprise a significant segment of Tahoe's total housing inventory; they represented about 56 percent of all dwelling units in 1970 but declined to 44 percent in 1978.

b. Occupancy Rates, Adequacy, and Cost

Planners at Tahoe indicate that occupancy rates and housing costs have increased and housing adequacy has decreased dramatically in the last 4 years. However, data for these variables are available for 1974 only.

In 1974, 29 percent of all dwelling units were vacant during the summer, and 38 percent were vacant during the winter. Although these appear to be high vacancy rates, housing availability was inadequate even in 1974. Many home owners in Tahoe are seasonal visitors and choose not to rent their property during periods of vacancy. Consequently, these housing units are not available, and a true measure of housing availability requires considerations that go beyond vacancy rates. In Tahoe, measures of housing adequacy must include consideration of those existing households which are: (i) "overpaying" for their house, (ii) living in substandard conditions, and, (iii) experiencing overcrowding.

Overpaying is generally defined as a monthly payment or rental cost greater than 25 percent of household income. Using this definition, in 1974, 20 percent of south shore families who owned homes were overpaying and 8 percent of north shore families were overpaying. In 1976, this percentage increased to 45 at the south shore and remained the same at the north shore. This difference in housing availability and adequacy between the south and north shore is also manifested in overpayment by renters. In 1974, 68 percent of the household population in the south shore with incomes under $10,000, were overpaying; but a large number of rental units were available to households with higher incomes. In the north shore, only 30 percent of renters were overpaying. For perspective, renter

overpayment nationwide is about 42 percent. Thus, the proportion of households overpaying at the south shore is considerably higher than the national average, but it is lower in the north shore area. The frequency of overpayment at the south shore reflects the lower income of service employees, the inadequate available supply of low and moderately priced rental units, the second home/tourist rental market, and inflation of rental prices caused by tourist demand. On the other hand, the north shore rental market has a larger supply of low and moderately priced rental units relative to household income.

Overcrowding is defined as more than 1.01 persons per room and is both a symptom of an inadequate housing supply as well as a contributor to substandard housing. According to the 1970 Census, about 9 percent of all the occupied housing units in the Tahoe area were overcrowded. The problem is potentially worse in the south shore than the north shore because the south shore is susceptible to sudden significant changes in its economy.

All of these problems are apparently worse now than in 1974. Vacancy rates are estimated at 10 to 15 percent in the off-season and essentially zero during summer and winter peak periods. Both overpayment and overcrowding are thought to be significantly higher now than in 1974. Present housing inadequacy is probably caused by a combination of the sewer bans and nationwide inflation, both of which increase the price of housing.

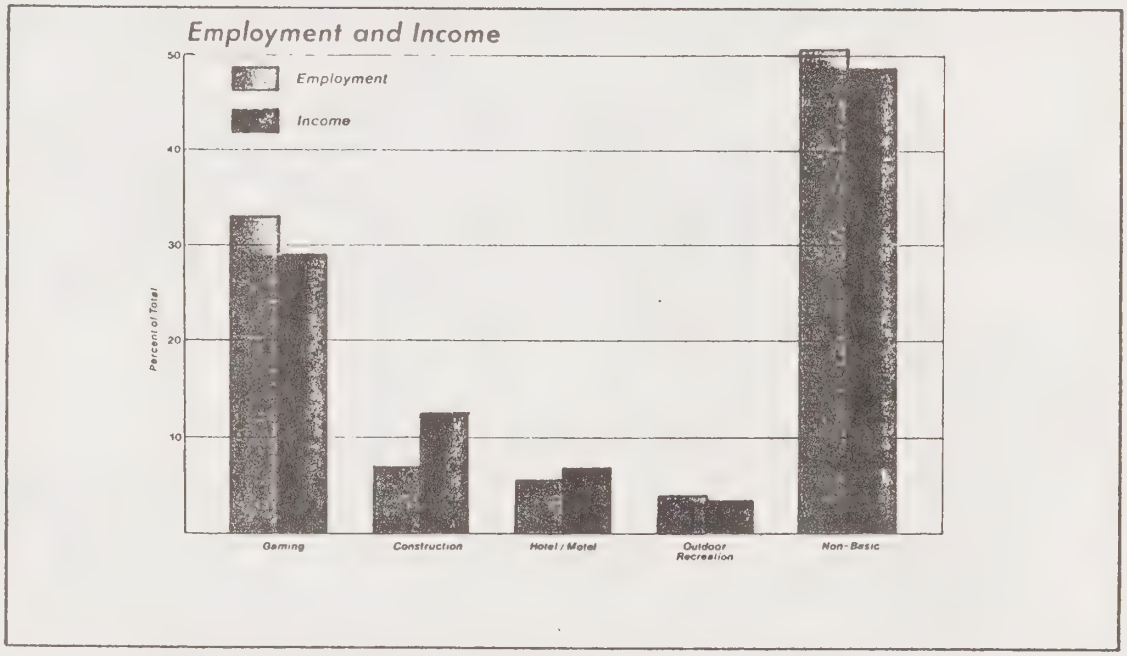
3. The Economy

The industries that contribute money to the economy of an area in the form of salaries and wages are generally divided into "basic" and "non-basic". Basic industries are those that bring income into the area from outside of that area's boundaries. In contrast, income related to non-basic industries is largely derived from local sources.

In the Lake Tahoe Basin, the major basic industries are gaming, hotel/motel operation, outdoor recreation, and construction. With the exception of construction, all of these are directly related to tourism where the income source is external to the Basin. Construction is considered basic because a large proportion of development in the Basin is financed by out-of-Basin sources. At Tahoe, non-basic industries are almost entirely service-related. These include wholesale and retail trade, finance, business, medical and educational services, and government. The residents of Tahoe spend more money on retail items and on services than do visitors; consequently, they are considered non-basic industries.

Employment and income distribution in these industries are shown in Figure 7. As shown, the four basic industries (gaming, hotel/motel, construction, and outdoor recreation) account for 49.1 percent of employment and 51.3 percent of income in the Basin. Of these, the

Figure 7: Distribution of Employment and Income Among Industries in the Lake Tahoe Basin



Source: WFRC. 1979

gaming industry dominates, accounting for about one-third of all employment and income. Household income in the gaming industry is somewhat lower than the average income in the Basin, reflecting the large number of low-paying jobs in that industry. The non-basic industries are dominated by retail trade, which accounts for 15 percent of all employment and income in the Basin.

These percentages remain fairly constant in winter and summer but the absolute values change dramatically between seasons. In 1970, annual average employment was 18,420, increasing to 38,060 by 1978. This represents a 107 percent increase in employment at Tahoe, which is substantially greater than the 20 percent increase in employment nationwide during the same period. At Tahoe, winter employment is about 75 percent as great as summer employment, in response to decreased tourist activity. Similarly, the occancy rate of Tahoe's 12,000 hotel/motel rooms decreases from an average of 77 percent in summer to 28 percent in winter. This seasonality of tourist activity is one of the factors that account for the high unemployment rates, which are characteristic of Tahoe's economy. The attractiveness of the area to young people also contributes to the unemployment problem.

Also characteristic of tourist-oriented economies such as Tahoe's, is the high percentage of residents that are employed. At Tahoe, about half of the residents are employed; there is an average of only 3.6 people per household, 1.9 of whom are employed. For perspective, in California as a whole only about one-third of the members of a household are employed. Because a higher than average proportion of household members are employed, the average household income in the Lake Tahoe Basin is also higher than average. In 1974, the average household income at Tahoe was about $19,730 per year (1975 dollars), and was higher in the Nevada portion of the Basin than in the California portion.

When one of the basic industries expands (e.g., gaming), it creates employment. These new jobs, along with the population influx and income that result, increase the demand for good and services in the non-basic industries. This, in turn, creates more jobs accompanied by additional population growth and income. Every additional job in a basic industry is estimated to create an average of 1.04 jobs in a non-basic industry.

The money that enters the Basin (662 million in 1978, expressed in 1975 dollars) is spent primarily on wages, sales and occupancy taxes, retail goods, construction materials, and other (overhead, profit, etc.). Of all money entering the Basin, 67 percent goes to the basic industries and 33 percent to the non-basic industries. But some of the money entering the basic industries indirectly supports the non-basic industries; 64 percent of the money entering the Basin eventually supports the non-basic industries (33 percent directly and 31 percent indirectly from the basic industries).

D. Water Quality and Quantity

The most extensive and recent review of the current water quality and quantity situation within the Lake Tahoe Basin is contained in two reports prepared by the California State Water Resources Control Board (SWRCB). These are:

- Lake Tahoe Basin Water Quality Plan, September 1980.
- Report on Water Use and Water Rights - Lake Tahoe Basin, October, 1979.

Much of the information contained in this section is drawn from these reports. These reports are included by reference into this EIS.

1. Existing Water Quality of Lake Tahoe

Lake Tahoe is a water body of exceptional natural purity, one of the clearest lakes in the world (Smith, et al, 1973). While lakes generally contain more algae and become less transparent with age, this natural eutrophication had not proceeded to any significant extent before recent human disturbances in the Lake Tahoe Basin. The natural balance has been upset, however, and Lake Tahoe is deteriorating. Over the past 20 years, the rate of algal growth in the Lake has more than doubled. The algal growth rate is increasing at an accelerating rate. Evidence indicates that the Lake's exceptional water clarity has diminished within the last decade. If the trend continues, the Lake's translucent blue color will be altered.

Table 7 summarizes the physical and chemical conditions in the open waters of Lake Tahoe as they existed in the late 1960's and early 1970's when comprehensive studies of water quality were conducted (Dugan & McGauhey, 1974; Goldman, 1974; California-Nevada-Federal Investigation, 1975). Nutrient concentrations are very low, falling within a range where nutrient availability limits algal growth. Other water quality measures indicate excellent conditions for support of game fish and other desirable aquatic life. Dissolved oxygen levels approach and occasionally exceed saturating levels throughout the year at all depths. Hydrogen ion concentration measured by pH averages 7.6, ranging from 7.0 to 7.9. Chloride concentration is low.

A white ten-inch diameter Secchi disk is visible on an average day down to 28.5 meters, and on the clearest days to 38 meters. Table 8 compares Secchi disk measurements for Lake Tahoe and other lakes in California. Secchi disk measurements for Lake Tahoe, as well as suspended solids and turbidity readings, indicate extraordinary clarity. The water is so clear that light penetration is sufficient to support algal growth within a deep euphotic zone extending to a depth of 100 meters or more. Secchi disk data collected by the U. C. Davis Tahoe Research Group shows a trend of decreasing water clarity over the past 12 years (See Figure 8). Decreasing water clarity is most pronounced for data collected in winter months, typically the time when water clarity is greatest.

TABLE 7

PHYSICAL AND CHEMICAL CHARACTERISTICS OF LAKE TAHOE*

PARAMETER	APPROXIMATE VALUE
Dissolved Oxygen	8.8 mg/l 1/
Dissolved Oxygen	104 % saturation 1/
pH	7.6 1/
Suspended Solids	2.6 mg/l 2/
Turbidity	0.2 JTU 1/
Nitrate–N	13 µg/l 3/
Total Nitrogen	133 µg/l 4/
Total Phosphorus	9.3µ g/l 5/
Total Iron	20 µg/l 6/
Chlorides	1.7 µg/l 1/

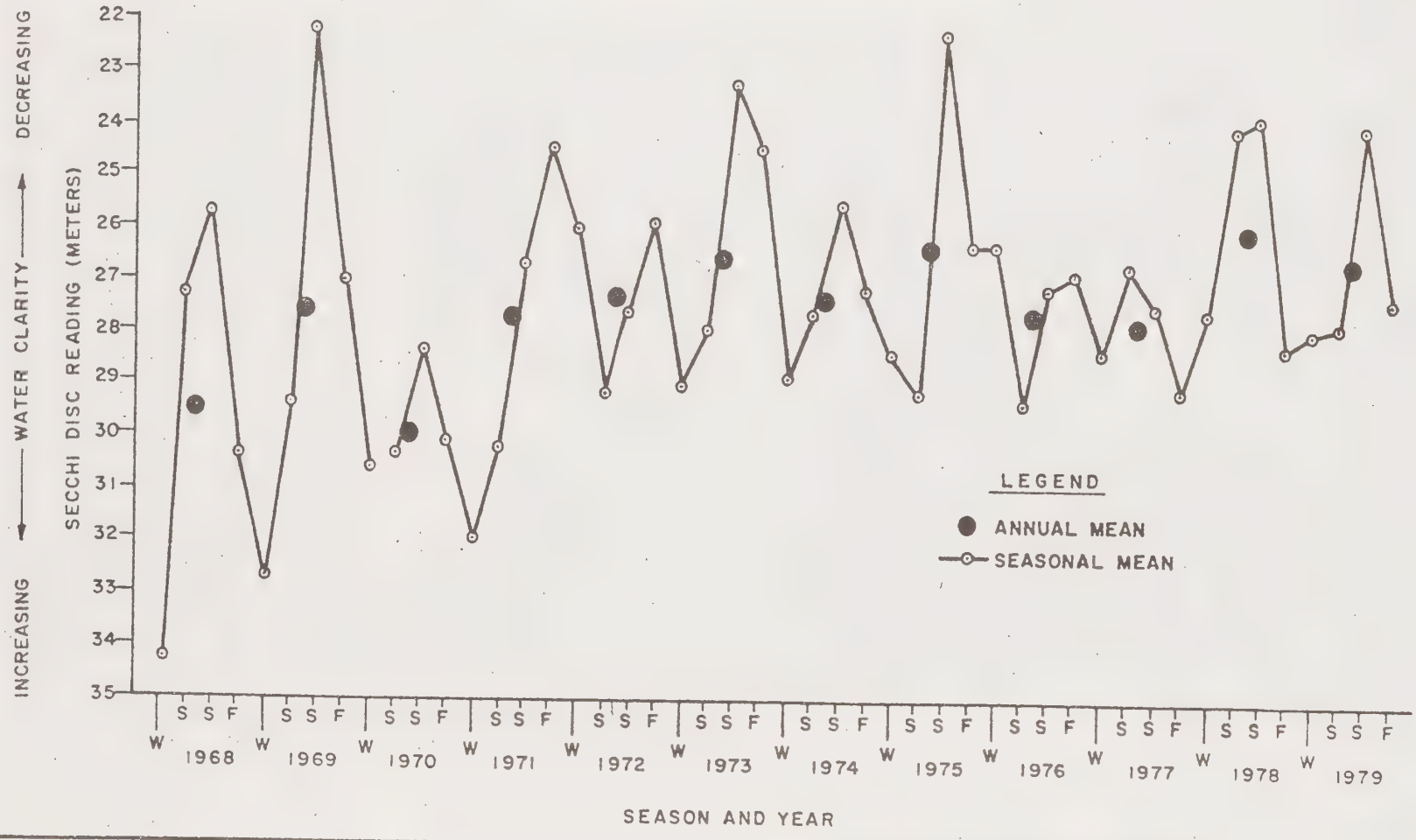
* Abstracted from Tahoe Regional Planning Agency Draft 208 plan (July 1977). Primary Sources: 1. Dugan and McGauhey (1974); 2. McGauhey (1971); 3. Paerl, et al (1975); 4. Dugan and McGauhey (1974); McGauhey (1971). (mean value); 5. Goldman (1974); Dugan and McGauhey (1974); McGauhey (1971). (mean value); 6. Elder, pers. comm. in 1975.

TABLE 8

COMPARATIVE WATER CLARITY OF CALIFORNIA LAKES AND RESERVOIRS *

HIGH ALTITUDE MOUNTAIN LAKES	MEAN SECCHI DISK Depth (Meters)
Lake Tahoe	28.5
Donner Lake	11.9
June Lake	8.8
Independence Lake	7.2
Silver Lake	5.7
Gull Lake	5.6
Lake Almanor	3.4
FOOTHILL AND LOW ALTITUDE LAKES	
Lake Berryessa	4.9
Lake Shasta	4.5
Folsom Lake	4.2
Lake Don Pedro	3.1
Lake Isabella	1.5
Clear Lake	0.3

* Abstracted from the files of the California Department of Water Resources, Central District.



ANNUAL AND SEASONAL MEAN
SECCHI DISK DATA, 1968-1979
Source: SWRCB, 1980

Figure 8

Data reflecting the biological productivity of the open waters of Lake Tahoe from 1959 through 1978 are summarized in Table 9. Productivity measurements reflect the growth rates of suspended microscopic algae (phytoplankton). Algal growth rates in Lake Tahoe are among the lowest of any lake in the world. Low rates of production result in a low density of algal cells, as is reflected in chlorophyll-a measurements.

The processes which control algal growth can be illustrated by considering the seasonal cycle of productivity in Lake Tahoe. During the winter low light intensity and low temperatures limit algal growth. With the approach of spring, increasing sunlight, warmer temperatures, and available nutrient supplies produce conditions which favor increased productivity. Peak seasonal productivity falls off in late spring as nutrients are depleted in the euphotic zone, well before the onset of optimum light and temperature conditions which peak in summer. In fall and winter algal growth rates are further reduced by decreased sunlight and lower water temperatures. Winter mixing of relatively nutrient rich, deep waters into the surface euphotic zone restores nutrients which support the next cycle of algal growth the following spring. (Paerl, et al, 1975). The seasonal addition of nutrients associated with spring runoff further accentuates the nutrient cycle.

There is considerable additional evidence that algal growth is severely nutrient limited. Bioassay experiments have found that sewage and stream runoff added to Lake Tahoe water markedly increases algal growth rates (Lake Tahoe Area Council, 1968; Goldman, 1974). Finally, the measured concentrations of nutrients in Lake Tahoe (nitrogen, phosphorus and iron) are well below the levels where experiments and field studies of other aquatic environments have found phytoplankton growth to be limited by nutrient availability (Holm-Hansen, et al, 1976).

Measurents of algal growth rates clearly indicate trends in water quality, and show that human activity is altering the quality of Lake Tahoe. Studies of phytoplankton growth in recent years indicate accelerated rates of production. The season of maximum phytoplankton productivity has lengthened; it now extends well into summer, formerly a period of decreasing production attributable to nutrient depletion (Goldman, 1974).

The most convincing evidence comes from a 19-year record of phytoplankton productivity measurements at a single (index) station in the open waters of the Lake (Goldman and de Amezaga, 1975, and Goldman unpublished data). The record is reproduced in Figure 9. The rate of algal production has increased in every consecutive year since the beginning of the record with the exception of 1976 and 1977, two years of extreme drought. The diminished algal production rates during the drought may reflect the importance of nutrients derived from land runoff. More extensive data collected at several stations throughout the Lake from 1968 through 1971 (Goldman, 1974) show similar trends, indicating a Lake-wide increase in algal growth rates. The 1979 data point and the preliminary analysis of the 1980 data, neither of which are shown in Figure 9,

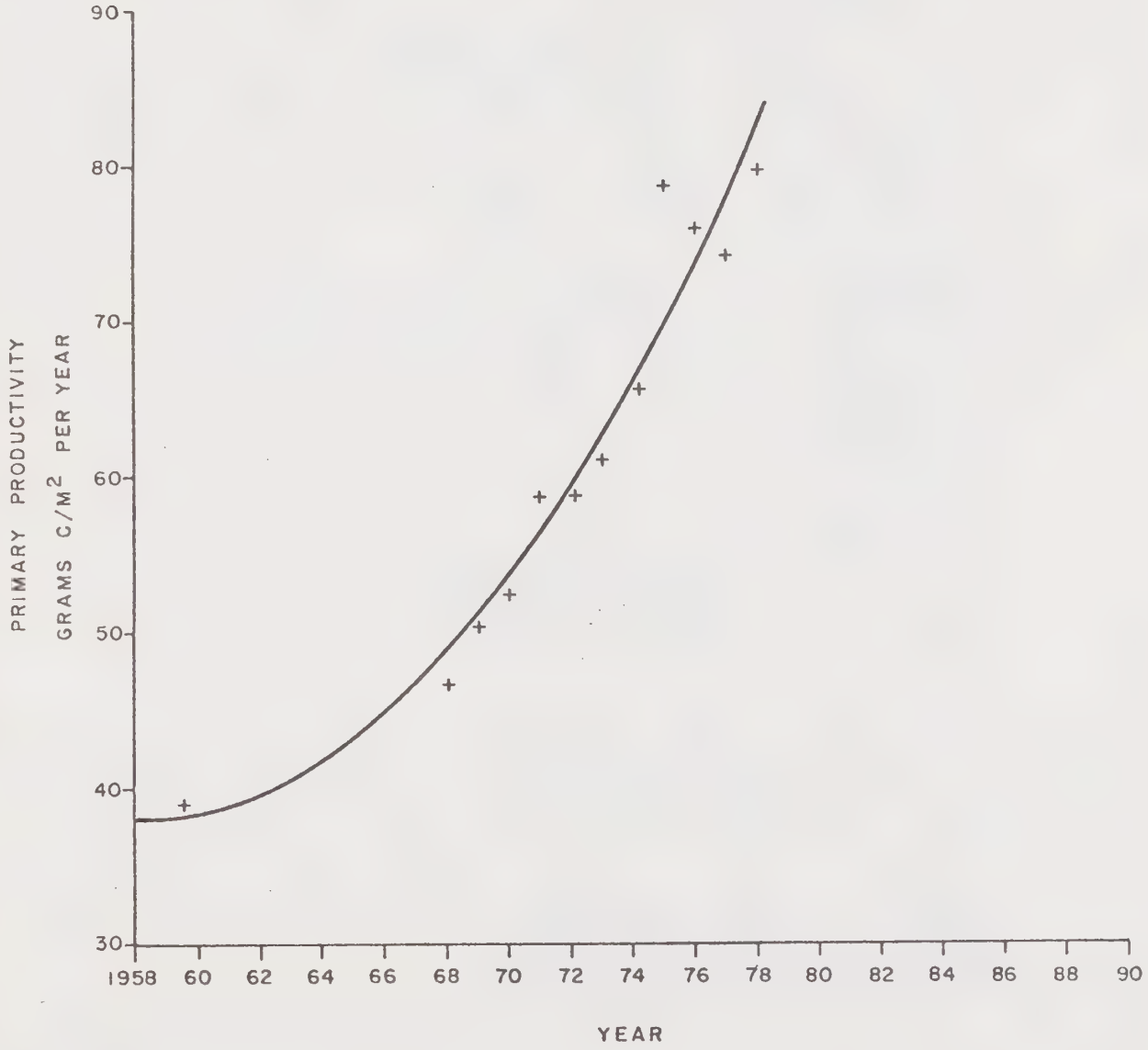
TABLE 9

BIOLOGICAL CHARACTERISTICS OF LAKE TAHOE *

Average Photosynthetic Rate	0.18	mgC/m^3 hr
Maximum Photosynthetic Rate	0.35	mgC/m^3 hr
Average Concentration of Chlorophyll a in Upper 100 meters	0.4	mg/m^3
Depth of Maximum Photosynthetic Rate	23	meters
Maximum Extent of Photosynthesis	100	meters
Secchi Depth	26	meters
Light Extinction Coefficient	0.07	ln/meter
Algal Growth Potential	0.20	mg/m^3
Chlorophyll a	0.13	mg/m^3
Maximum Algal Growth Rate	20	%/day

* Abstracted from Tahoe Regional Planning Agency Draft 208 plan (July 1977). Primary Sources: Tilzer, J. pers. comm. in 1975; California Nevada Federal Investigation (1975).

Figure 9



*DATA SOURCES: 1959-1971 (Goldman, 1974); 1972-1978 (Goldman, unpublished)

Source: SWRCB, 1980

ANNUAL PRODUCTIVITY OF PHYTOPLANKTON

ALGAE IN THE OPEN WATERS OF LAKE TAHOE, 1959-1978*

show a continuing upward trend in the rate of primary productivity in Lake Tahoe. Preliminary analysis of the 1980 data shows a rate of primary productivity of over 90 grams C per square meter per year, a significant and alarming increase.

The extent of the increase is more than a doubling in algal growth rates over the 20 years of record. The rate of production does not appear to be stabilizing. Rather, the record, suggests an acceleration of the rate of eutrophication extending up through the most recent measurements.

Nearshore waters of Lake Tahoe provide the main visual evidence of water quality to persons visiting the Lake. Changes in nearshore water quality may also indicate trends occurring more slowly in open waters. Reported changes in nearshore water are a cause for serious concern because they indicate that Lake Tahoe is visibly deteriorating. Scientists studying the Lake, Basin residents, and regular visitors to the Lake report an increase in attached algal growth in nearshore waters (Loeb, 1980). Sediment plumes also provide visible evidence of water quality degradation.

There is evidence that periphyton growth, like phytoplankton growth, is severely limited by nutrient availability. Heaviest growths are clearly associated with localized sources of nutrients (Fraga, 1965). Lahontan (1978) and Loeb (1980) have found that the distribution of attached algae directly correlates with the extent of land disturbance around Lake Tahoe. Algal production rates adjacent to heavily developed areas are two to 20 times those of control sites adjacent to relatively undisturbed watersheds. Figure 10 depicts the variation in algal growth rates at the south end of Lake Tahoe detected by the Regional Water Quality Control Board, Lahontan Region, in 1976.

Sediment plumes which cloud nearshore waters are a highly visible indication of nearshore water quality. These plumes of turbid water frequently are observed issuing from the mouths of streams which drain disturbed watersheds. The occurrence and size of sediment plumes correspond to rainfall events and to the spring peak in snowmelt and stream discharge. Because of the variability of these events and the spatial complexity of the plumes, the limited physical measurements which have been taken of nearshore water transparency are not adequate to assess trends.

2. Existing Water Quality of Tributary Streams

Tributaries draining subdivided or otherwise developed areas contain higher concentrations of nutrients than streams which drain relatively less disturbed watersheds. Streams in disturbed watersheds have an algal growth stimulating potential which is ten times that of streams in relatively undisturbed watersheds. (California Nevada Federal Investigation, 1975).

The data shown in Table 10 compare the average quality of streams draining relatively natural areas and those draining obviously disturbed watersheds. The differences between disturbed and undisturbed watersheds probably are even greater than suggested by

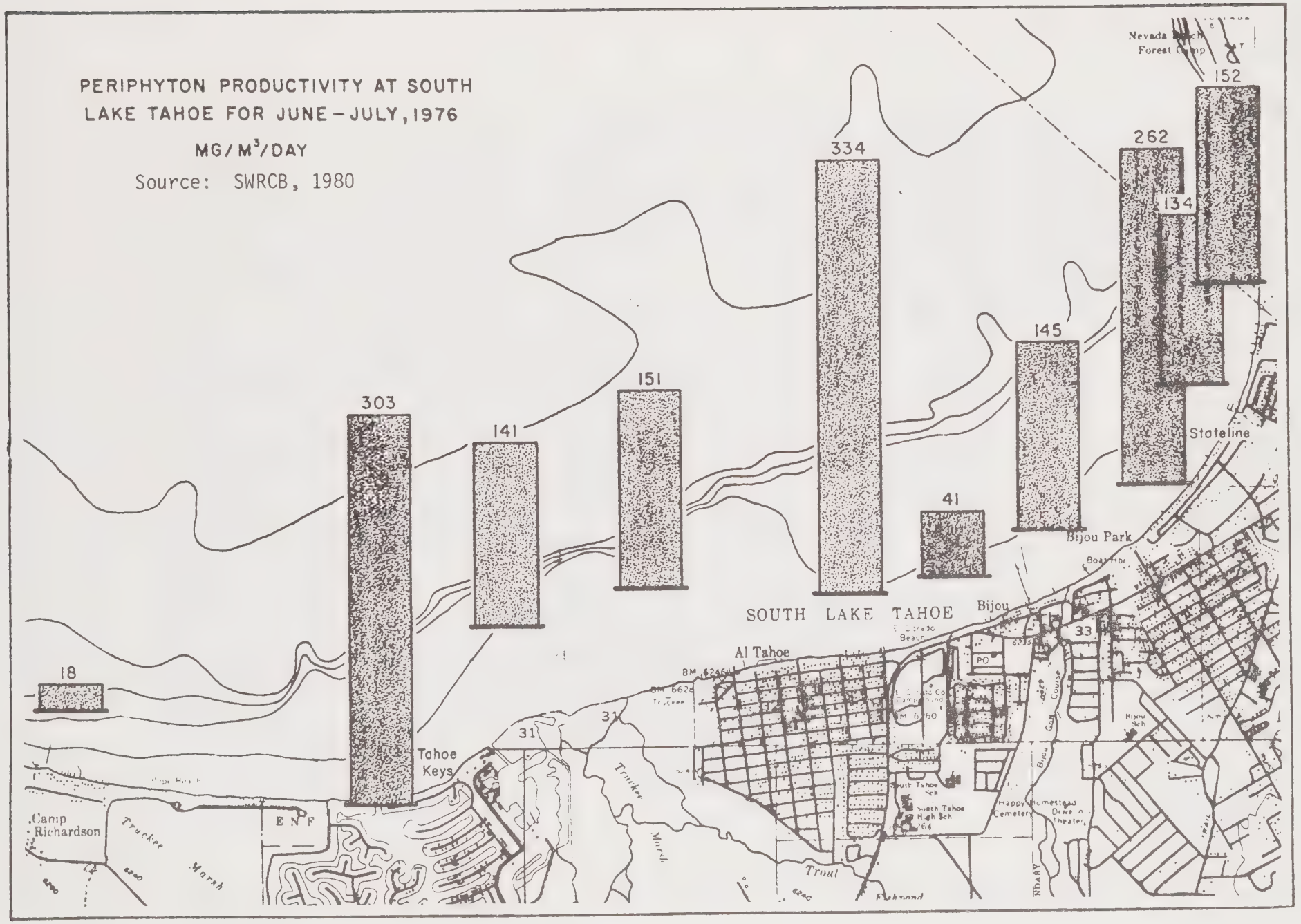

PERIPHYTON PRODUCTIVITY AT SOUTH LAKE TAHOE FOR JUNE - JULY, 1976
MG/M³/DAY
Source: SWRCB, 1980
18
303
141
151
334
41
145
262
134
152
Stateline
Bijou Park
SOUTH LAKE TAHOE
Bijou
Al Tahoe
Tahoe Keys
Camp Richardson
Truckee Marsh
Trout
33
31

Figure 10

TABLE 10

MEAN QUALITY OF TRIBUTARY STREAMS *

PARAMETERS	DISTURBED	UNDISTURBED
Dissolved Oxygen (mg/l)	9.7	9.6
Dissolved Oxygen (% saturation)	98	100
pH	7.3	7.1
Suspended Solids (mg/l)	.8	4
Turbidity (JTU)	5	0.5
Nitrate–N (µg/l)	47	30
Total Nitrogen (µg/l)	300	252
Total Phosphorus (µg/l)	29	15
Total Iron (µg/l)	97	45
Chloride (mg/l)	1.2	0.5
Algae Growth Potential (µg/l)	0.5	0.05

* Comparison of physical, chemical, and biological data from 21 tributaries draining disturbed watersheds and 15 tributaries draining areas which have not been developed. Abstracted from Tahoe Regional Planning Agency Draft 208 plan (July 1977). Primary Sources: California Nevada Federal Investigation (1975); Goldman (1974); McGauhey (1971).

estimates in the table. There are no truly undisturbed watersheds in the Lake Tahoe Basin. Many were logged within the last century, and all now have highways or roads which are important sources of stream sediment loads. In disturbed watersheds, most sediments and nutrients are discharged during short episodes of peak stream flow (Leonard et al, 1979; White, 1978).

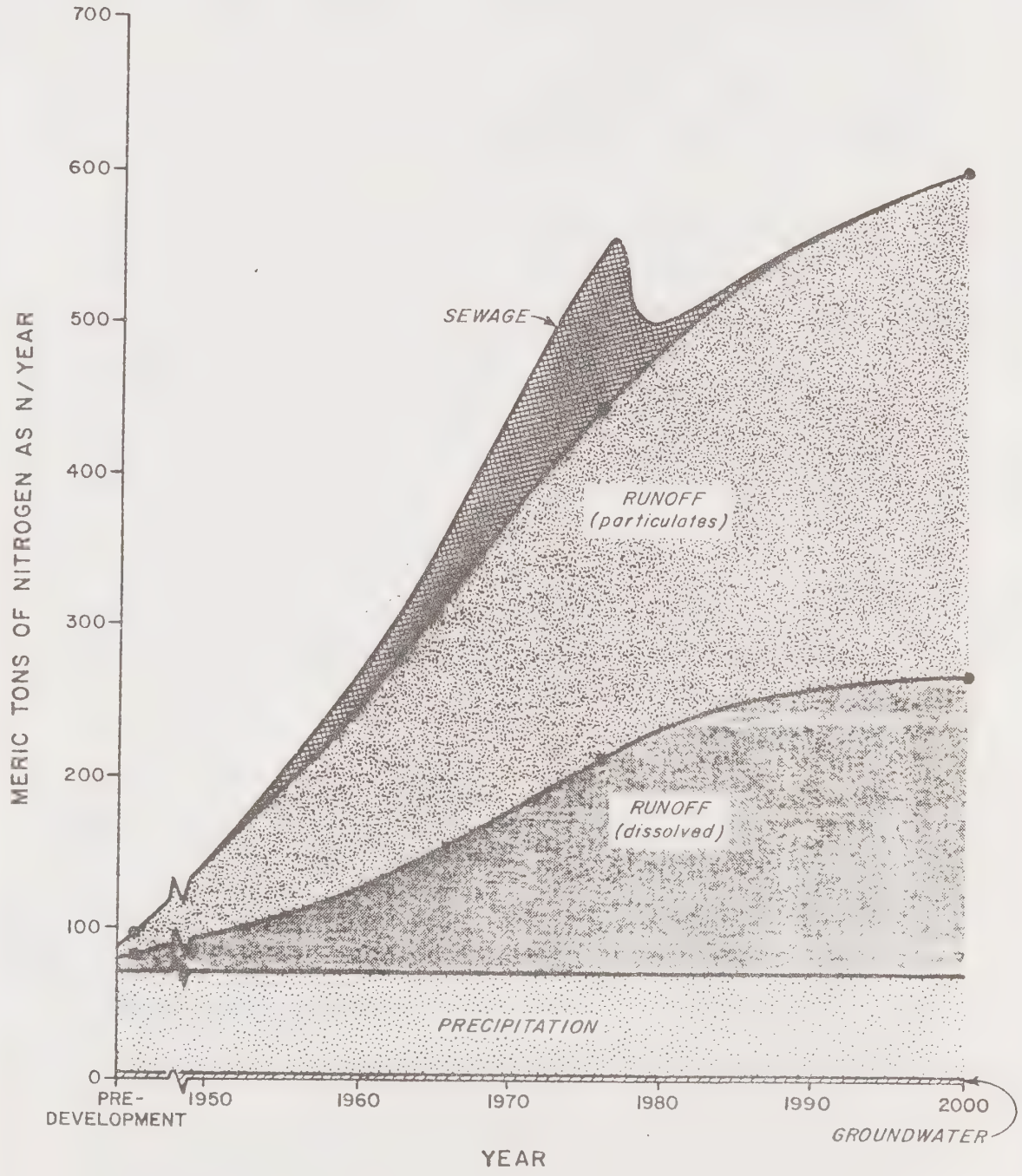
Sampling programs which form the basis of average water quality estimates in Table 10 were not designed to accurately assess sediment and nutrient loads occurring during short duration peaks in stream flow.

Impacts of erosion range from subtle to obviously detrimental changes in stream quality. A study by the Lahontan Regional Water Quality Control Board (Baker and Davis, 1976) found significant reductions in abundance and diversity of aquatic organisms downstream of disturbed areas, with several types of organisms eliminated. In the worst cases, siltation smothered organisms which provide food for fish, obliterated spawning and nursery habitats of sport fish, limited recreation potential and impaired the appearance of streams. In cases where increased erosion has not visibly affected streams, the additional nutrients released by erosion still contribute to the eutrophication of the Lake. Data collected as part of the State Water Resources Control Board's Lake Tahoe Erosion Control Demonstration Project (White and Franks, 1978) documented up to a 99% reduction in aquatic life in a stream tributary to Lake Tahoe due to damaging development and disturbance of its watershed. Conversely, another watershed developed in conformance with land capability and with implementation of mitigation measures was shown to have almost no impact on monitored aquatic life.

3. Water Quality Problems

Current water quality problems and trends are tied to increasing nutrient and sediment loads entering Lake Tahoe. Nutrients enter Lake Tahoe through erosion and surface runoff, groundwater flows, washout of airborne materials in rain and snow, and leaching of sewage previously disposed on land. Figure 11 shows the estimated annual loading rate for total nitrogen -- a major growth stimulating nutrient. The curve in Figure 11 assumes long-term average hydrologic conditions applied on a year-to-year basis. In reality, the curve would show much more fluctuation and scatter on a year-to-year basis as a result of annual variations in hydrologic conditions. However, it is believed that the overall trend over the past several decades is as depicted in Figure 11. Similar curves for suspended sediment, phosphorus, and iron are contained in the SWRCB plan (SWRCB, 1980). It should be emphasized that because the nutrients which enter the Lake each year remain for much longer periods. Nutrient concentrations and algal growth rates in the Lake reflect the nutrient loadings sustained over many years. Short-term fluctuations in annual nutrient loadings are not likely to have any major effect.

Figure 11



LOADING RATES OF NITROGEN TO LAKE TAHOE

Source: SWRCB, 1980

Evaluation of present suspended sediment and nutrient sources within the Lake Tahoe Basin leads to the following conclusions:

- Sediment and nutrient loads have increased greatly above natural conditions; and

- Surface runoff is the dominant source of nutrients to Lake Tahoe, and will become even more important in the future.

- Prevention of further detrioration of the quality of Lake Tahoe will require that nutrient and sediment loads be reduced to a fraction of current levels.

a. Surface Runoff

Surface runoff from eroding land carries soil particles (sediment) and plant nutrients that otherwise would remain in the soil. Furthermore, urban runoff primarily from impervious surfaces also shows significant increases in suspended sediment and nutrient levels over undisturbed conditions. Overall, nutrient levels in surface water runoff increase when suspended sediment levels increase.

Any attempt to quantify suspended sediment and nutrient and loads using limited data will not produce an exact representation of events which are actually occurring. In order to precisely record such loading rates, sophisticated water quantity/quality data would be required for a number of major watersheds in the Lake Tahoe Basin. Such data have only begun to be collected within the Lake Tahoe Basin as part of the Lake Tahoe Interagency Water Quality Monitoring Program. It will be several years before the data base will be sufficiently developed to provide comprehensive information. However, sufficient data exist to prepare generalized estimates of historical, existing and projected levels of suspended sediment a nutrient loads to Lake Tahoe.

The first major attempt to quantify annual suspended sediment and nutrient loading rates due to surface runoff took place as part of the original development of the TRPA Water Quality Management Plan (TRPA, 1977). The procedures used to develop loading rates are completely described in that report. There were, however, several problems with the procedures used with that plan. These include:

- All water samples collected for areas of a similar land use type were averaged to estimate the annual average constituent concentration of runoff from that land use. No attempt was made to relate the samples collected to type and/or intensity of runoff events.

- The model made no attempt to account for differences in land capability. Thus, a low density residential subdivision on high erosion hazard land was assumed to have the same annual average unit runoff concentration as a similar subdivision on low erosion hazard lands.

- The model made no attempt to account for differences in density of development within each land use type. Thus, a low density residential subdivision was assumed to have the same annual runoff concentration whether all or only a few of the lots had been built upon.

- No water quantity data were collected. Empirical formulas were used to estimate annual runoff flows which were combined with the estimated annual average concentration to determine estimated annual loading rates.

- Runoff from land zoned general forest was used to estimate runoff for the entire Lake Tahoe Basin under natural conditions. This did not account for numerous man-induced disturbances on lands zoned General Forest which surely affected runoff quality.

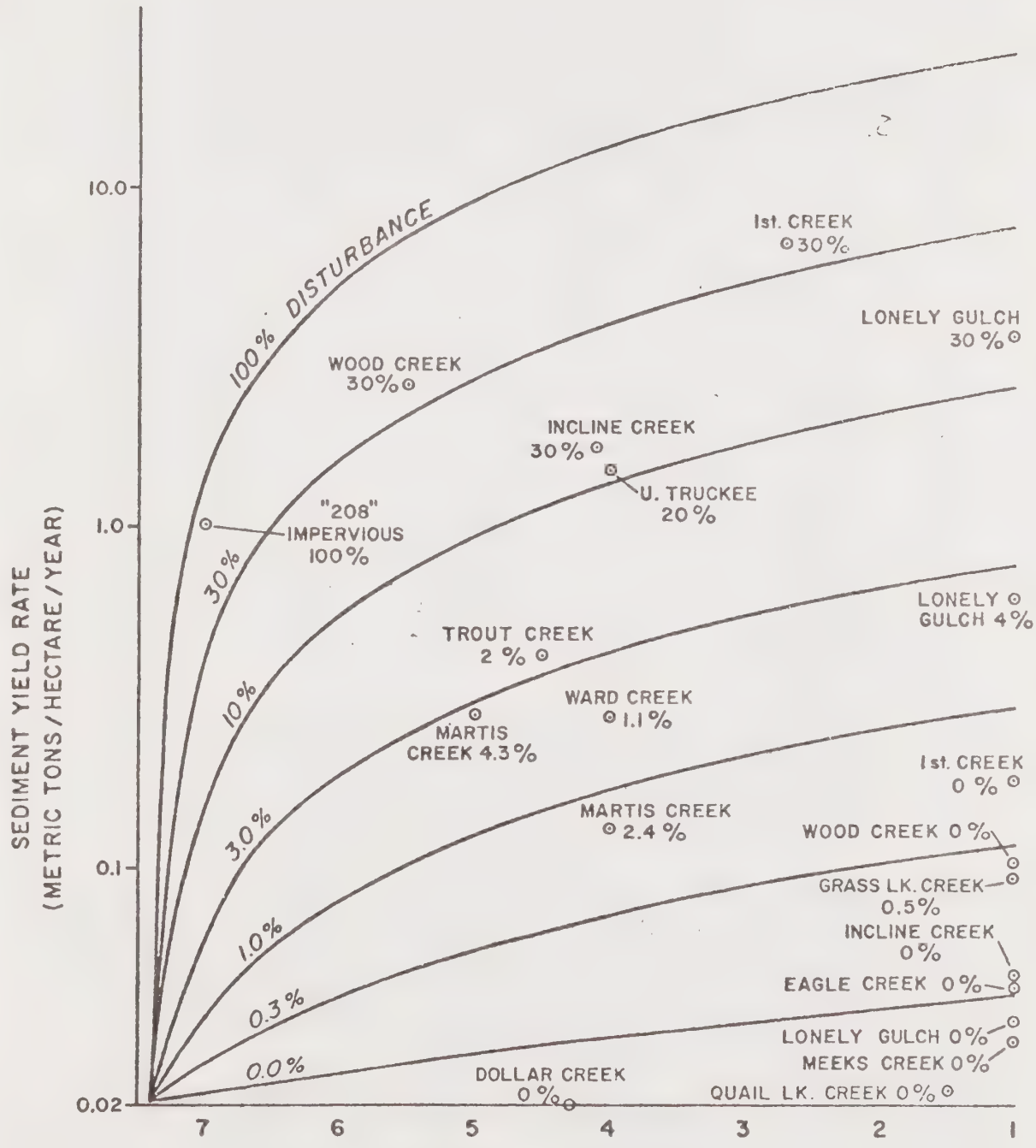
In developing the SWRCB's "Lake Tahoe Water Quality Plan" a second attempt was made to quantify total sediment and nutrient loads to Lake Tahoe. This approach was significantly different in that it addressed the following factors:

- Annual sediment load data from specific intensely monitored watersheds were the primary source of water quality/quantity information.

- Rather than to use land use zones, the SWRCB's approach related development intensity and land capability classes to changes in water quality. The variability of annual suspended sediment loads between watersheds was shown to be highly related to the intensity of urbanization and the degree to which development occurs on varying land capability classes.

Figure 12 shows the relationship between suspended sediment yield rate, variation in intensity of development as measured by percent disturbance, and variations on the placement of development on various land capability classes as described by Bailey (1974). A complete description of how these curves were developed is contained in Appendix B to the California SWRCB's plan (SWRCB, 1980). While the SWRCB model cannot be considered

Figure 12



Source: SWRCB, 1980

Sediment Yield Rate as a Function of Percent Disturbance and Land Capability Class for the Lake Tahoe Basin

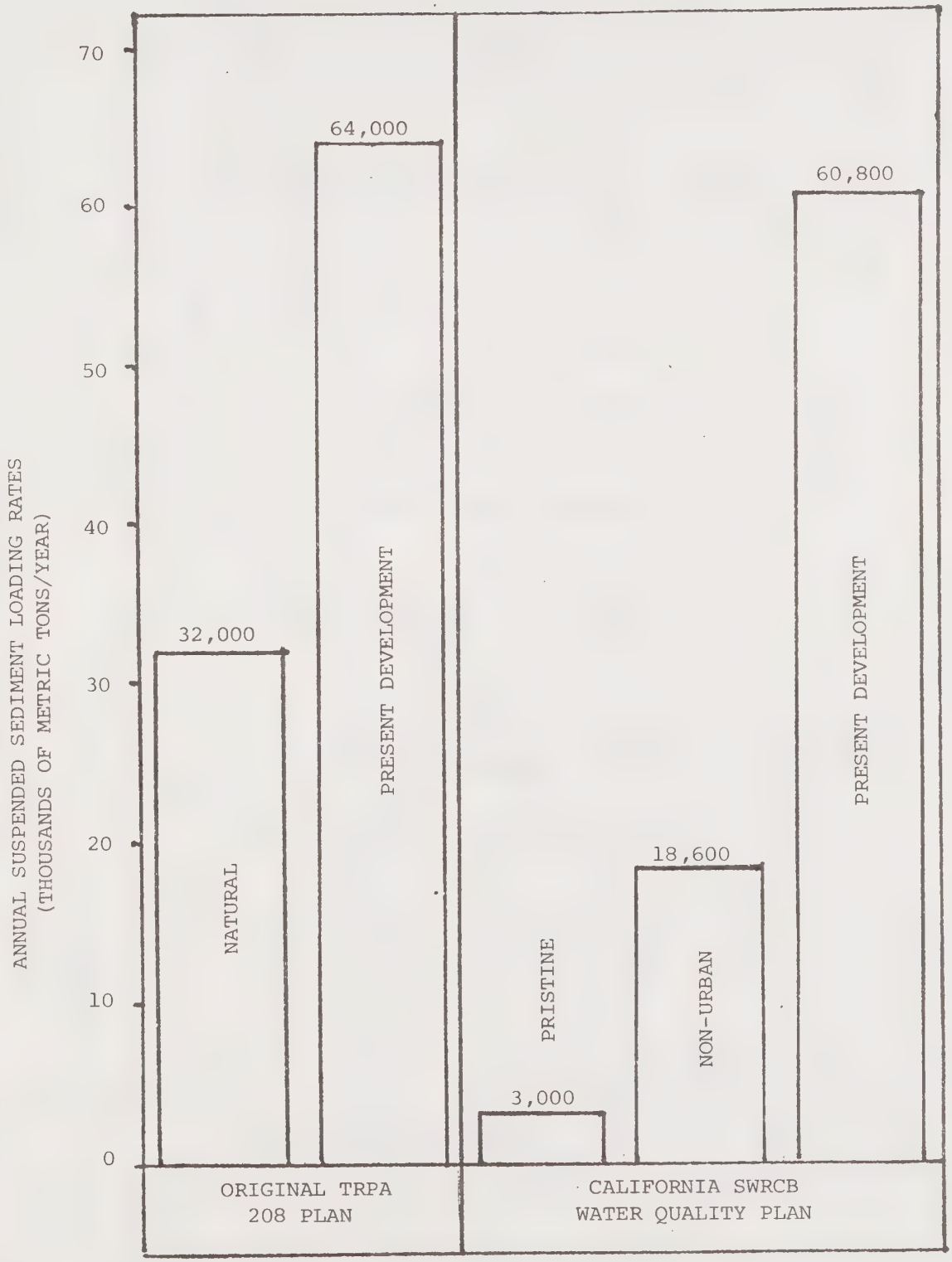
an exact quantification of the impacts of development, it is a valuable tool for comparing the relative impacts of development according to its location and intensity, and is a far more accurate representation of conditions in the Tahoe Basin than the original TRPA model.

Figure 13 compares the suspended sediment yield projections for the original TRPA and the California SWRCB Lake Tahoe Water Quality Plan. The estimates of present levels of suspended sediment loading rates are actually quite similar. There are, however, large discrepancies between estimates of natural or pristine sediment loading rates. These discrepancies are largely due, however, to differing terminologies. The original TRPA estimates of "natural" loading rates were based upon runoff data collected from lands zoned General Forest. In reality many of these lands support uses, including private dwellings, which differ substantially from what could be called "natural conditions. In this light, the original TRPA value for "natural" conditions is quite similar to the value estimated in the California SWRCB plan for non-urban conditions. The SWRCB's estimate of natural or "pristine" sediment loading is meant to be a comparitive reflection of the estimated conditions prior to any substantial disturbance by human activities. It should be noted that under natural pristine conditions storm and snowmelt runoff from almost 50% of the Lake Tahoe Basin was discharged to large lakes and extensive meadows and marshes. These acted as efficient sediment and nutrient traps to further reduce natural loadings to Lake Tahoe. At least 30-40% of this natural treatment capacity has been lost due to development and urbanization of the Lake Tahoe Basin.

The unit sediment yield rates for a variety of different study areas are compared in Figure 14. This figure shows that the range of values which are discussed in the various Lake Tahoe water quality plans are comparative to unit sediment yield values for a variety of different areas.

Although some erosion and accompanying nutrient loading occurs under natural conditions, the process has been tremendously accelerated by development. Nutrient concentrations in runoff are increased not only by erosion on developed properties but also by the presence of impervious surfaces. Impervious surfaces reduce the capacity of the natural soil-vegetation system to capture and hold nutrients.

Figure 13



COMPARISON OF PAST AND PRESENT ESTIMATED SUSPENDED SEDIMENT LOADING RATES IN LAKE TAHOE BASIN

Source: SWRCB, 1980

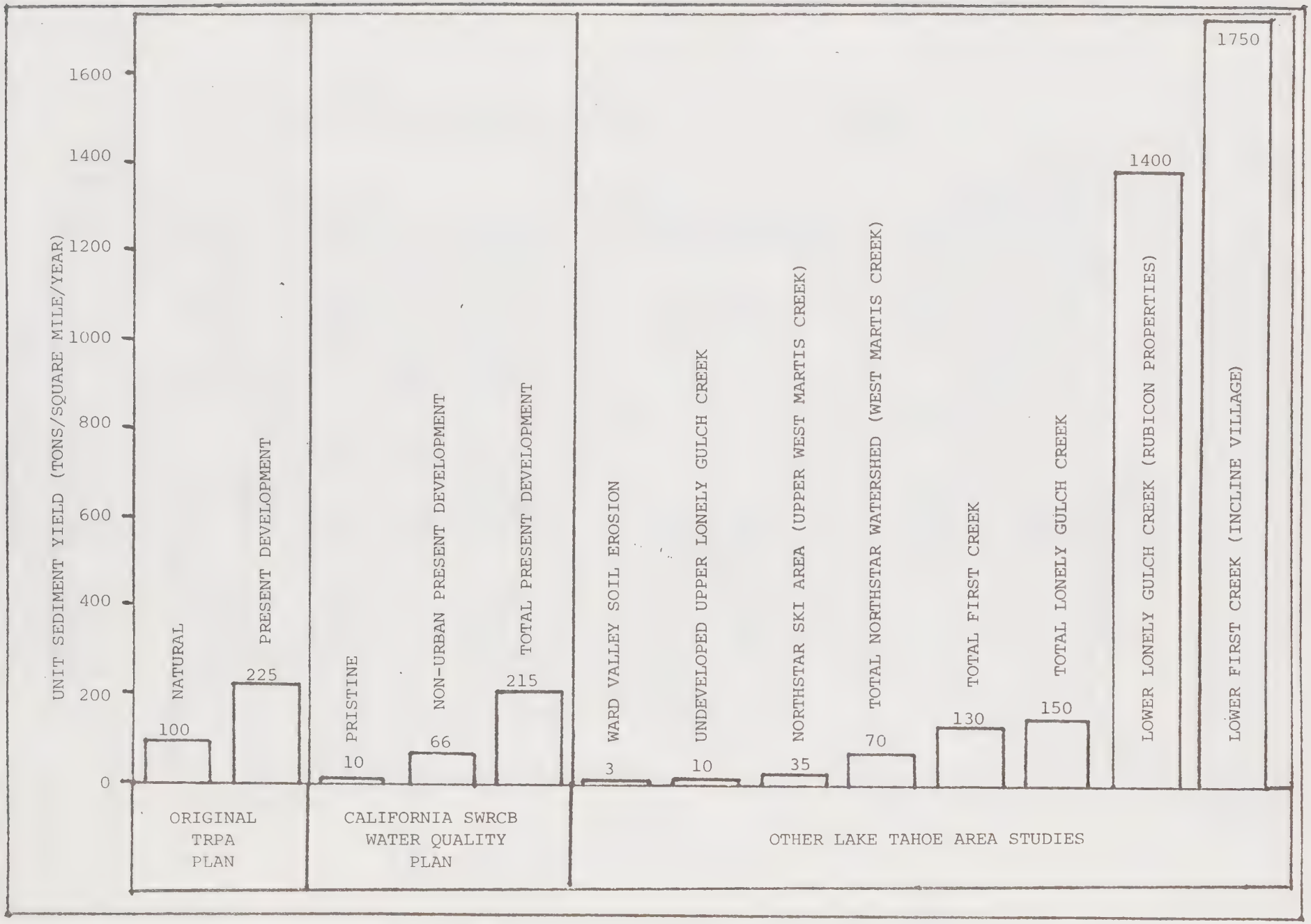


Figure 14

Figure 14: COMPARISON OF UNIT SEDIMENT YIELD RATES

Nutrient loads to Lake Tahoe are estimated to be 5 to 16 times natural conditions. They will increase to 6 to 22 times natural conditions if development is allowed according to existing TRPA ordinances. Specific erosion and surface runoff problems which can be corrected or prevented can be classified as:

i. Erosion and drainage problems. Erosion and drainage problems identified in the field survey as part of preparation of TRPA's 1977 draft 208 plan are categorized as follows:

- Areas stripped of vegetation
- Unstable roadway slopes
- Unsurfaced roads, streets, and driveways
- Eroding roadway shoulders and roadside ditches
- Inadequate or unstable drainage systems.

Table 11 shows the controllable soil loss from each of the types of erosion and drainage problems. It can be seen from review of this Table that:

- Over 50 percent of the controllable soil loss is the result of unvegetated areas and oversteepened slopes. These problems can be addressed through implementation of relatively inexpensive revegetation and mechanical stabilization techniques.
- Almost 50 percent of the controllable soil loss is generated by problems located on high erosion hazard lands. Only about 20 percent of the existing developed area in the Basin is located on high hazard lands. The high soil loss from high erosion hazard lands illustrates the fragility of these lands and their intolerance to urbanization.
- Dense development in any area of the Basin greatly increases soil loss. About 60 percent of present development in the Basin is on low erosion hazard lands. Although the unit soil loss from these lands is low, dense development has created so many erosion and drainage problems that the cumulative soil loss is one-third of the Basin total.

TABLE 11
COMPARATIVE CONTROLLABLE SOIL LOSSES by HAZARD RATING
for EROSION and DRAINAGE PROBLEMS (metric tons/year) *

EROSION HAZARD RATING	Areas Stripped of Vegetation	Unvegetated and Oversteepened Roadway Slopes	Eroding Roadway Shoulders and Ditches	Eroding Dirt Roads	Unstable Drainage Systems	TOTAL	PERCENT OF TOTAL
HIGH							
California	520	2,380	2,020	980	680	6,580	23%
Nevada	1,130	3,650	1,710	330	470	7,290	26%
TOTAL	1,650	6,030	3,730	1,310	1,150	13,870	49%
MODERATE							
California	50	1,610	2,430	710	400	5,200	18%
Nevada	40	1,550	150	150	0	1,890	6%
TOTAL	90	3,160	2,580	860	400	7,090	24%
LOW							
California	40	1,480	1,790	230	800	4,340	15%
Nevada	30	2,540	510	60	410	3,550	12%
TOTAL	70	4,020	2,300	290	1,210	7,890	27%
TOTAL							
California	610	5,470	6,240	1,920	1,880	16,120	56%
Nevada	1,200	7,740	2,370	540	880	12,730	44%
Basin	1,810	13,210	8,610	2,460	2,760	28,850	100%
PERCENT OF TOTAL	6%	46%	30%	7%	11%	100%	

* Soil loss estimates include suspended sediment from sheet, rill and gully erosion. This table does not include soil loss from U.S. Forest Service lands, on-site runoff problems, or other problem areas not specifically included in Table III-6. This table is for comparative purposes only.

Source: SWRCB, 1980

ii. Onsite surface runoff problems

Based on data collected in the preparation of the 1977 Draft TRPA 208 Plan, it is estimated that 4,000 metric tons per year of controllable suspended sediment is discharged to waters of the Basin from areas with onsite runoff problems.

Surface runoff problems which can be attributed to site-specific activities were classified in the 1977 Draft TRPA 208 Plan as onsite problems. These include:

- Areas of intensive vehicular use
- Unsurfaced private roads
- Snow storage and disposal areas
- Construction sites
- Golf courses and other fertilizer use areas.

Table 12 compares runoff data gathered for the TRPA's 1977 Draft 208 Plan from lands zoned general forest with that from urbanized areas. The values in the Table are based on a relatively small number of samples and, therefore, provide only a rough indication of the quality of surface runoff from various areas.

Tables 13 and 14 show the estimated relative impact of fertilizer use in the Lake Tahoe Basin. This data are based upon a study of fertilizer use in the Lake Tahoe Basin (Mitchell, Reisenauer, 1974).

As shown in Table 14, golf courses are the largest source of nitrogen leached from applied fertilizer. Not only is most of the fertilizer applied on golf courses, but it is applied at a much higher rate, resulting in a higher percentage leaching to surface and groundwaters. In addition, golf courses are generally located within or adjacent to stream environment zones, where fertilizers and other chemicals can readily enter surface or groundwaters. There are currently eight golf courses in the Lake Tahoe Basin, covering about 783 acres.

iii. Problems from future development

Further urbanization in the fragile environment of the Tahoe Basin, no matter how well controlled, will increase the loading of sediment and nutrients on Lake Tahoe. Full development of the Lake Tahoe Basin, as

TABLE 12

POLLUTANTS IN RUNOFF FROM VARIOUS ACTIVITIES

ACTIVITY	Suspended Solids mg/l	Turbidity FTU	Nitrate Nitrogen mg/N/l	Total Nitrogen mg N/l	Total Phosphate mg PO_4/l	Total Iron mg/l	Chloride mg/l	Grease & Oil mg/l
Lands Zoned General Forest	66	6	0.03	0.2	0.1	0.4	1	0.6
Disturbed Lands:								
Denuded Areas	990	320	0.25	4.1	1.7	1.9	31	8.0
Construction Sites	8,700	760	0.12	4.0	0.5	2.3	20	0.1
Land Use Related:								
Rooftop Drainage	30	7	0.02	0.8	0.5	4.7	13	7
Corporation Yards	440	140	0.07	3.3	0.8	7.7	170	57
Mobile Home Parks	5,700	930	0.10	0.9	0.8	4.4	34	24
Auto Service Stations	280	110	0.21	0.8	0.9	1.3	16	12
Horse Stables	71	27	0.02	1.8	2.2	6.2	10	9
Snow Storage Sites	140	90	0.10	3.5	0.6	0.2	13	10
Unstable Drainage Systems:								
Earthen Roadside Ditches	650	180	–	3.2	1.0	1.1	32	28
Earthen Channels	610	310	0.11	1.3	1.0	0.8	20	31
Transportation Related:								
Unpaved Parking Lots	17,000	1,000	–	9.2	3.5	3.4	33	76
Paved Parking Lots	320	110	0.56	3.8	1.6	1.0	24	43
Unpaved Roads and Driveways	7,800	5,100	0.88	2.6	1.2	3.2	21	38
Paved Streets	680	280	0.14	1.2	0.9	0.9	15	24
Roadway Cuts and Fills	440	300	0.16	1.0	0.7	0.5	9	7

Source: TRPA, 1977

TABLE 13

ESTIMATED APPLICATION of NITROGEN and PHOSPHATE
in FERTILIZER APPLIED in the LAKE TAHOE BASIN

AREA	ESTIMATED 1970 ACREAGE	NITROGEN as N Rate Applied (lbs/acre)	Total (tons) 1970	Total (tons) At Ultimate Development	PHOSPHATE as P_2O_5 Rate Applied (lbs/acre)	Total (tons) 1970	Total (tons) At Ultimate Development
Golf Courses	520	115	30	45	40	10	15
Home Yards	740	40	15	30	15	5	10
Multiple Units	60	40	2	6	15	< 1	2
Schools	40	40	2	3	15	< 1	2
TOTAL	1460		49	84		17	29

Source: SWRCB, 1980

TABLE 14

ESTIMATES of NITROGEN LEACHED to SURFACE
and GROUNDWATERS from FERTILIZER

AREA of FERTILIZER USE	TOTAL NITROGEN as N LEACHED (metric tons/year) 1970	At Ultimate Development
Golf Courses	2.7	4.1
Home Yards	0.6	1.2
Multiple Units	0.1	0.2
Schools	0.1	0.1
TOTAL	3.5	5.6

Source: SWRCB, 1980

allowed by the TRPA General Plan, would result in the additional discharge of an estimated 24,500 metric tons of suspended sediment per year. Development causes erosion and increases nutrient loadings through:

(a) Increases in Erosion and Runoff

An inventory of the Basin lands by their erosion hazard rating is shown on Table 15. Nearly 2,000 acres of high erosion hazard land could be urbanized in the future. The resulting increase in nutrient and sediment loading on Lake Tahoe would be substantial. Development of an additional 4,300 acres of moderate and low erosion hazard land would also cause substantial increases in nutrient and sediment generation. Sediment and nutrient generation would be increased primarily due to the following processes:

- Removal of vegetation, which increases surface runoff and sheet and rill erosion. Disturbing vegetation also reduces nutrient uptake. All undisturbed, vegetated lands act to reduce nutrients and sediments in runoff. Vegetation in stream environment zones plays an especially important role in trapping sediment and nutrients which otherwise would be transported to the Lake.

- Construction of impervious surfaces. Paved areas collect pollutants from vehicles and atmospheric sources and discharge them in surface runoff. Infiltration of precipitation is greatly reduced, surface runoff dramatically increases, and downstream rill and gully erosion is greatly increased by development.

(b) Encroachment on Stream Environment Zones

Stream environment zones are areas influenced by the presence of streams and near-surface groundwater, including wetlands and floodplains. Movement of surface runoff as sheet flow through these areas allows larger sediments to settle out while vegetation filters out smaller suspended material. Nutrients are stripped out and support vegetative growth. A portion of the nutrients absorbed by plants is released to the atmosphere as gaseous products of organic decay, and some of the nutrients absorbed by plants later are bound up in the soil and buried by additonal sediment. Thus, vegetation in stream environment zones reduces the amount of nutrients

TABLE 15

INVENTORY of BASIN LANDS by EROSION HAZARD *
(Area in Acres)

BASIN LAND	EROSION HAZARD RATING			TOTAL
	HIGH	MODERATE	LOW	
Existing Urbanized Areas 1/	3,685	4,021	10,277	17,983
Areas of Potential Urbanization 2/	1,975	1,037	3,293	6,305
Private Holdings Zoned General Forest	60,625	1,790	3,716	66,131
SUBTOTAL	66,285	6,848	17,286	90,419
PUBLIC LAND 3/	104,278 4/	4,892	6,123	115,293
TOTAL	170,563	11,740	23,409	205,712

* Source: Tahoe Regional Planning Agency (1977)

1/ Areas of one acre or more with existing utilities and/or substantially surrounded by existing development.
2/ Zoned for urban uses but not now developed.
3/ Data from Land-Capability Classification Report, 1974.
4/ Includes an undeterminable amount of Ib Capability lands.

that would otherwise be transported to the Lake. Placement of fill material, structures, or any other encroachment by development limits the capacity of stream environment zones to convey surface and underground flows, and eliminates their treatment and filtration capacity.

The capability of an undisturbed stream environment zone to treat surface runoff is shown in Table 16. The data were developed for the TRPA's Draft 208 Plan.

In 1977, the United States Environmental Protection Agency conducted a study of the nutrient and sediment removal abilities of stream environment zones in the Tahoe Basin (Morris, et.al., 1980). The study indicates that:

- Stream environment zones where water moves as sheet flow provide effective treatment of surface runoff.

- This natural treatment capability is destroyed in stream environment zones where development causes channelized flow.

- Channelized stream environment zones may actually increase sediment and nutrient loadings in areas where erosion is caused by concentrated runoff.

Development in stream environment zones also creates erosion problems by concentrating surface runoff, contributing to streambank erosion, and by disturbing areas subject to periodic inundation by streamflows. An inventory of private lands within the Basin identified 9,205 acres as stream environment zones. Results of this inventory are as follows:

- There are 2,739 acres which are in a natural state and not zoned for development.

- There are 2,090 acres which are in a natural state but zoned for potential urban use.

- There are 4,376 acres of stream environment zone lands which have been subdivided or otherwise developed. The level of disturbance in these areas ranges from moderate (where streets and other public services have been installed but most lots are vacant) to total (where the physical characteristics of the stream environment zone have been destroyed and its benefit as a conveyance and treatment system lost). Much of this subdivided area consists of

TABLE 16

NATURAL TREATMENT CAPABILITY

of UNDISTURBED STREAM ENVIRONMENT ZONE

STATION	CONCENTRATION (mg/l)			
	SUSPENDED SOLIDS	TOTAL NITROGEN as N	PHOSPHATE as PO_4	IRON
Above	493	1.424	0.982	1.060
Midway	162	0.300	1.019	0.706
Below	29	0.395	0.141	0.300
Reduction in Concentration	94%	74%	86%	72%

Source: TRPA, 1977

lands which have not yet been built upon and are critical elements of the surface water treatment and conveyance systems.

In addition to the 9,205 acres of stream environment zones on private land in the Lake Tahoe Basin there are 15,971 acres of stream environment zones on National Forest lands.

(c) Forest lands

Surface runoff from the forest lands of the Basin is of a much higher quality than that from urbanized areas, but still can be substantially degraded by certain uses. An estimated 15,500 metric tons of suspended sediment are discharged to Lake Tahoe every year as a result of uncontrolled erosion problems on forest lands. Over one-third is from eroding dirt roads and jeep trails. Water quality problems may be caused by:

- Timber harvesting
- Dirt roads
- Offroad vehicle use
- Livestock confinement and grazing
- Campgrounds
- Ski resorts

In addition to the 144,000 acres, or roughly 70 percent of the Basin, in National Forests or State Parks, approximately 36,000 acres are privately-owned forest lands. Most of the private forest land is held by some 40 owners with holdings of up to several thousand acres.

b. Other Water Quality Problems

Pollution from surface water runoff is by far the most important threat to the quality of Lake Tahoe, but there are other sources of pollution which should be controlled wherever possible. These include:

i. Groundwater

It is extremely difficult to quantify the increased nutrient loadings in subsurface flows as a result of development. Further development will increase nutrient transport in groundwater by removing vegetation which normally intercepts and recycles nutrients in the watershed.

Infiltration of onsite runoff, one of the methods for controlling surface runoff, could also increase the amount of nutrients transported in groundwater. Groundwater disposal of runoff is generally preferable to surface discharge because it provides for prolonged contact with soils and vegetation which remove sediment and nutrients. Infiltration should be encouraged. It should be recognized, however, that infiltration of surface runoff does not completely eliminate the water quality problems associated with development.

ii. Atmospheric Sources

To the extent that the nutrients in precipitation are the result of air pollution caused by human activities, an increase in these activities could increase the nutrients reaching the Lake.

Increases in automobile traffic, which result in increased emissions of oxides of nitrogen, could cause more nitrogen to reach the Lake in precipitation. Other nitrogen emissions may also be important.

Destruction of vegetation also increases the amount of nitrogen reaching the Lake from atmospheric sources. Most of the nitrogen in precipitation which falls on land within the Basin is removed before the water reaches the Lake. Disturbing the plants responsible for removing this nitrogen increases nutrient loadings to the Lake.

iii. Municipal Sewage

Completion of systems for the treatment and export of domestic sewage from the Lake Tahoe Basin has eliminated most of the threat to Lake Tahoe from domestic sewage. However, several problems remain.

- Unlined sewage pond
- Raw sewage overflows
- Effiltration from sewerlines
- Unconnected domestic wastewater

iv. Miscellaneous Water Quality Problems

Possible miscellaneous water quality problems include:

- Industrial discharges
- Solid waste disposal
- Construction and dredging in Lake Tahoe
- Vessel wastes
- Toxic and hazardous substance spills

4. Water Quantity Considerations

The estimated hydrologic budget of the Lake Tahoe Basin is depicted in Table 17.

Only a limited amount of water is legally available for municipal and domestic use in the Lake Tahoe Basin. If water use in the Basin increases beyond that limit, the rights of downstream water users dependent on the Lake's outflow into the Truckee River will be infringed upon.

Since 1901, when reliable records were first kept, the Lake Tahoe outflow has varied widely, ranging from 4,700 to 657,000 acre-feet per year. This wide range is due not only to climatic conditions but also to variation in the manner of operation Lake Tahoe as a reservoir. Over the past 76 years the average annual outflow to the Truckee River has been 179,400 af. During the 1977 drought year, total outflow was reduced to 81,000 af, with a 300,000 af loss in storage capacity. At the present time, existing watershed export, existing in-basin depletion, potential depletion under currently unused export rights total 20,000 acre-feet per year. During an average year this constitutes about 11% of the total Lake Tahoe outflow to the Truckee River. During the 1977 drought year existing and potential basin exports and in-basin depletion constituted 20% of the total Lake Tahoe outflow. At potential levels of future development within Lake Tahoe Basin, the net depletion may total about 30,000 afa or more. This depletion is 15% of the total average annual outflow and 30% of the 1977 drought year outflow of the Lake Tahoe Basin. Figures 15 and 16 show the historical and present levels of water diversion for use for the California and Nevada portions, respectively, of the Lake Tahoe Basin.

In 1968, after 13 years of extensive debate and negotiation, the Joint California-Nevada Interstate Compact Commission adopted the "California-Nevada Interstate Compact" allocating water in the Lake Tahoe, Truckee River, Carson River and Walker River Basins. California ratidied the Compact in 1970; Nevada ratified in 1971. Although ratification by Congress is still pending, the Compact has been accepted in both states as the only comprehensive basis available for allocating water rights. The principal uncertainty concerning the allocation made by the interstate water compact involves the unresolved claims of the Paiute Tribe of Indians of Pyramid Lake. These claims are for more water at Pyramid Lake, the terminus of the Truckee River, than is provided under the Compact. Thus, the allocation set by the Interstate Water Compact sets an upper limit on the amount of water which can be diverted for use in the Lake Tahoe Basin, but there is a possibility that the amount available will be less.

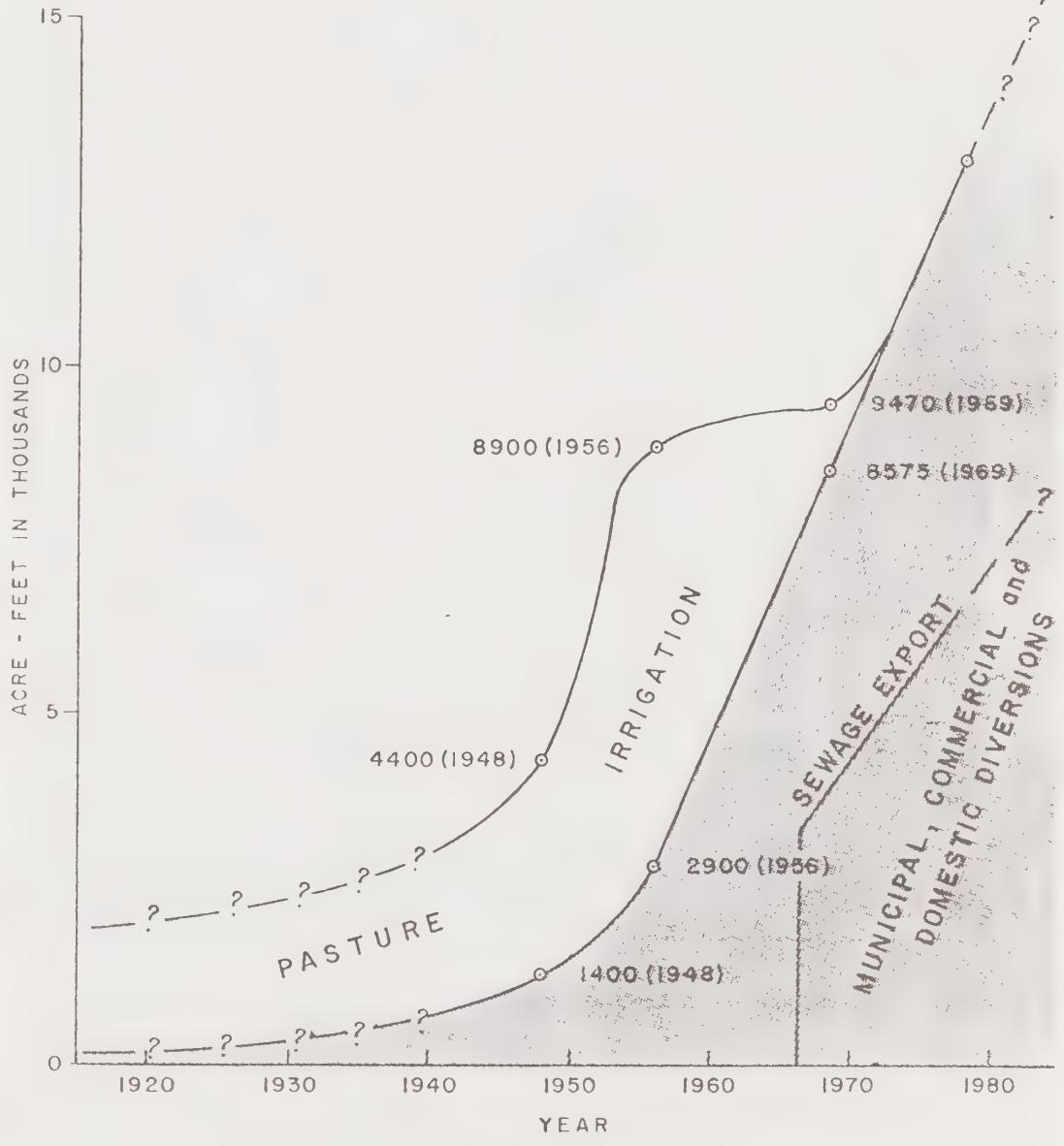
TABLE 17

LAKE TAHOE BASIN HYDROLOGIC BUDGET *

Storage	123,000,000 acre-ft/yr.
Inputs	
Precipitation directly on Lake Tahoe	236,700 acre-ft./yr.
Tributary runoff	411,600 acre-ft./yr.
Outputs	
Lower Truckee River and Export from Basin	187,700 acre-ft./yr.
Evaporation from Lake Tahoe	434,500 acre-ft./yr.
Change in Storage	−26,100 acre-ft./yr.

* Based on measurements from 1960 through 1974 (Tahoe Regional Planning Agency, 1977).

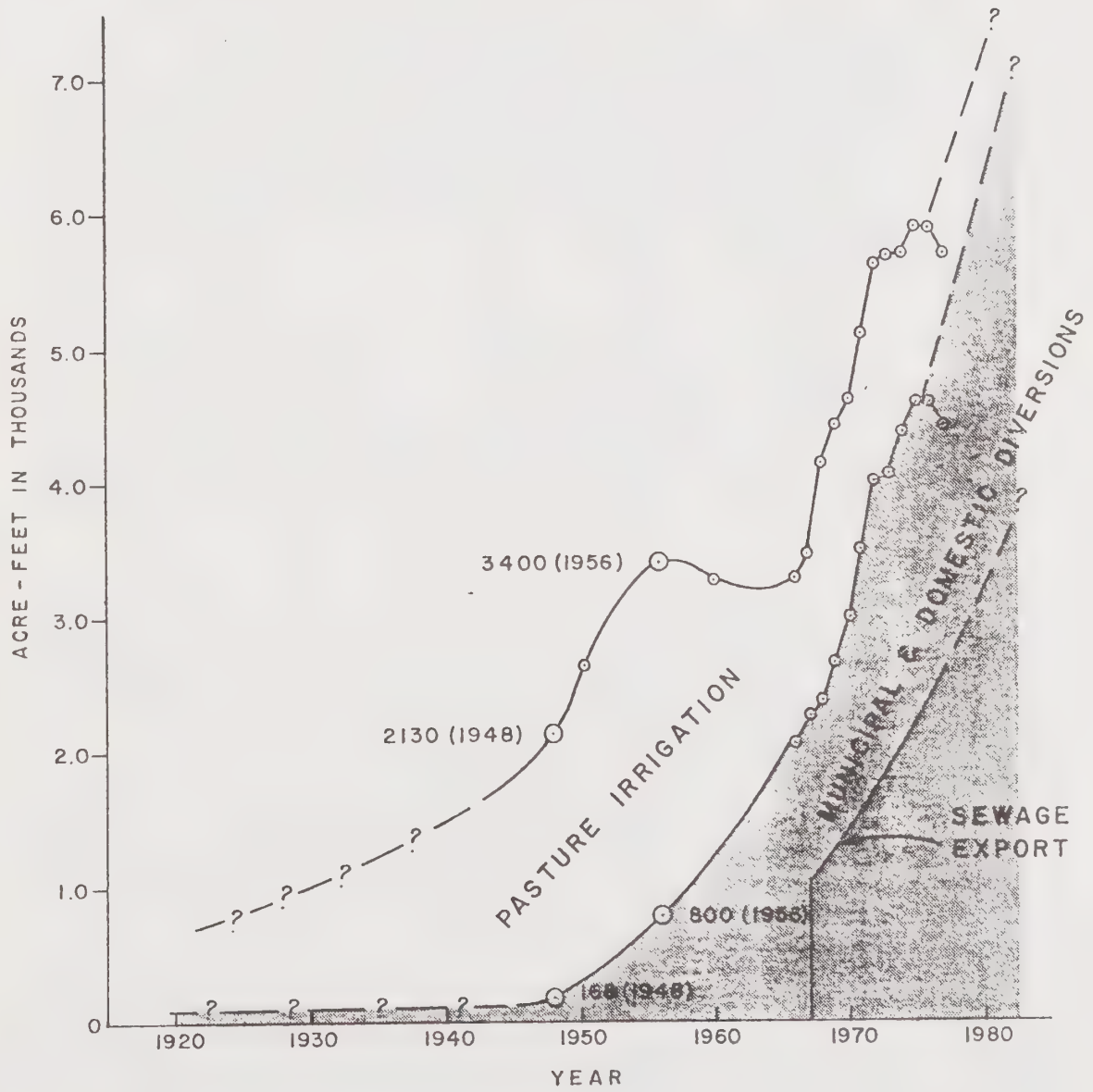
Figure 15



HISTORICAL WATER DIVERSION FOR USE WITHIN THE CALIFORNIA PORTION OF THE LAKE TAHOE BASIN. (IRRIGATION, MUNICIPAL, COMMERCIAL and DOMESTIC USES ONLY)

Source: SWRCB, 1980

Figure 16



HISTORICAL WATER DIVERSION FOR USE WITHIN THE NEVADA PORTION OF THE LAKE TAHOE BASIN (IRRIGATION, MUNICIPAL and DOMESTIC USES ONLY)
Source: SWRCB, 1980

Consistent with the hydrologic conditions of the Lake Tahoe watershed, where the groundwater and surface water systems are interconnected, the compact allocation is based on all diversions from ground and surface water. The Interstate Water Compact sets the total amount of water which may be diverted for use in the Lake Tahoe Basin at 34,000 acre-feet per year, with 23,000 acre-feet per year allocated to California and 11,000 acre-feet per year allocated to Nevada.

The presently unused portion of the Interstate Water Compact allocation could well be exhausted without the approval of any further subdivision development. Within the California portion of the basin, there are approximately 15,600 vacant lots in existing subdivisions. Full development of these lots, even with modest conservation measures, would lead to a level of water commitment in excess of the allocation specified in the Interstate Water Compact. Enforcement of the CTRPA Regional Plan and SWRCB Water Quality Plan will allow development on only about 8,500 of these lots, however, keeping water use on the California side within the compact allocation unless water use rates per household increase substantially.

Within the Nevada portion of the Basin, several individual water utilities may be rapidly approaching their legal water rights allocation. Incline Village General Improvement District, for example, does not appear to have sufficient existing water rights to serve buildout of existing subdivided areas within its jurisdiction. Furthermore, other potential water users, of which the U. S. Forest Service figures most prominently, hold water rights which they wish to preserve for uses other than urban development.

E. Air Quality

The following discussion is taken largely from WFRC (1979), CTRPA (1980b), and TRPA (1977), which are incorporated by reference. Additional information on air quality is included in Jones and Stokes (1981), EPA (1979), and Brown and Caldwell (1981).

The topography and climate of the Lake Tahoe Basin are conducive to the formation of stable air temperature inversions which trap air pollutants. Because of the number and stability of these inversions, the meteorological potential for air pollution is considered greater in the Tahoe Basin in both summer and winter than in any other area where air pollution is monitored in California (WFRC, 1979).

The most important classes of air pollutants in the Basin are carbon monoxide, nitrogen oxides, reactive hydrocarbons, and particulates. The primary source of emissions in the Basin is the automobile. Because less oxygen is available for combustion of gasoline at high elevations, more chemical Products of incomplete combustion are emitted per vehicle than at sea level.

Automobiles account for over 95% of the carbon monoxide produced in the Basin. Although there are more vehicles in the Basin in summer, carbon monoxide concentrations are greater in winter, because automobile emissions are greater at low temperatures. Carbon monoxide tends to be most concentrated in areas of congested traffic, increasing the health hazard to people living along transportation corridors. Carbon monoxide decreases the ability of the blood to carry oxygen; at high attitudes where less oxygen is available in the atmosphere, high carbon monoxide levels may have significant health effects.

Nitrogen oxides and reactive hydrocarbons are important as precursors of ozone and other oxidants, which form in the atmosphere in the presence of sunlight. The high solar radiation input to the Tahoe Basin because of its elevation is an important factor in determining ambient air quality. Most emissions of nitrogen oxides and reactive hydrocarbons are also from automobiles, but the combustion of heating fuels from stationary sources accounts for significant amounts of these pollutants in winter. Ozone forms downwind from the emission sources, and thus its impacts, such as damage to vegetation and reduction of visibility, can affect the entire Basin. No conclusive evidence exists of long distance transport of oxidants to the Basin from the Central Valley or elsewhere.

Most particulate emissions are from stationary sources such as space heating and dust from construction sites. Natural sources such as forest fires and pollen may also contribute to particulates, but 90 percent of particulates causing visibility reduction in the Basin come from human activities (WFRC, 1979).

Federal and state air quality standards for the Tahoe Basin are summarized in Table 18. The regulation of air quality in the Basin is the responsibility of the California Air Resources Board (ARB) and of TRPA. The 1977 amendments to the federal Clean Air Act require states to designate areas where federal air quality standards are not being met, and to prepare plans which include measures for achieving attainment of these standards. California and Nevada designated the Tahoe Basin as a "non-attainment area" for carbon monoxide and oxidants (measured as ozone) in 1977. In accordance with the nondegradation requirements of the federal Clean Air Act, Desolation Wilderness has been declared a Class I area, where air quality is to be preserved, maintained, and enhanced.

A non-attainment plan was prepared for the Basin by an Ad Hoc Committee composed of California and Nevada authorities. The plan has been adopted separately by the states with some differences in control measures. The federal standard for ozone has since been relaxed, and both states have applied for time to study whether the Basin should remain an ozone non-attainment area. In July, 1980, ARB requested redesignation of the California Portion of the Basin for attainment for ozone only. Violations of state ozone standards are still being reported, but the Clean Air Act requirements for designation of non-attainment areas address only federal, not state, air quality standards.

Table 18

AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards[1]		Nevada Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Concentration[3]	Method[4]	Primary[2]	Secondary[2]	Method
Oxidant (Ozone)	1 hour	0.10 ppm (200 ug/m^3)	Ultraviolet Photometry	235 ug/m^3 (0.12 ppm)	Ultraviolet Photometry or Chemiluminescent Method	235ug/m^3 (0.12 ppm)	Same as Primary Standard	Chemiluminescent Method
Carbon Monoxide	12 hour	10 ppm (11 mg/m^3)	Non-Dispersive Infrared Spectroscopy (NDIS)	–	–	–	Same as Primary Standards	Non-Dispersive Infrared Spectroscopy
	8 hour	–		10 mg/m^3 (9.0 ppm)	Non-Dispersive Infrared Spectroscopy (NDIS)	10 mg/m^3 (9 ppm)		
	1 hour	40 ppm (46 mg/m^3)		40 mg/m^3 (35 ppm)		40 mg/m^3 (35 ppm)		
Nitrogen Dioxide	Annual Average	–	Saltzman Method	100 ug/m^3 (0.05 ppm)	Proposed: Modified J-H Saltzman (O_3 corr.) Chemiluminescent	100 ug/m^3 (0.05 ppm)	Same as Primary Standards	Proposed: Modified J-H Saltzman (O_3 corr.) Chemiluminescent
	1 hour	0.25 ppm (470 ug/m^3)		–		–		
Sulfur Dioxide	Annual Average	–	Conductimetric Method	60 ug/m^3 (0.02 ppm)	Conductimetric Method	80 ug/m^3 (0.03 ppm)	–	Pararosaniline Method
	24 hour	0.05 ppm* (131 ug/m^3)		260 ug/m^3 (0.1 ppm)		365 ug/m^3 (0.14 ppm)	–	
	3 hour	–		1,300 ug/m^3 (0.5 ppm)		–	1300 ug/m^3 (0.5 ppm)	
	1 hour	0.5 ppm (1310 ug/m^3)		–		–	–	
Suspended Particulate Matter	Annual Geometric Mean	60 ug/m^3	High Volume Sampling	60 ug/m^3	High Volume Sampling	75 ug/m^3	60 ug/m^3	High Volume Sampling
	24 hour	100 ug/m^3		150 ug/m^3		260 ug/m^3	150 ug/m^3	
Sulfates	24 hour	25 ug/m^3	AIHL Method No. 61	–	–	–	–	–
Lead	30 Day Average	1.5 ug/m^3	AIHL Method No. 54	–		–	–	–
Hydrogen Sulfide	1 hour	0.03 ppm (42 ug/m^3)	Cadmium Hydroxide Stractan Method	–	–	–	–	–
Hydrocarbons (Corrected for Methane)	3 hour (6-9 a.m.)	–	–	160 ug/m^3 (0.24 ppm)	Flame Ionization Detection Using Gas Chromatography	160 ug/m^3 (0.24 ppm)	Same as Primary Standards	Flame Ionization Detection Using Gas Chromatography
Ethylene	8 hour	0.1 ppm	–	–	–	–	–	–
	1 hour	0.5 ppm		–				
Visibility Reducing Particles	1 observation	In sufficient amount to reduce the prevailing visibility[8] to less than 10 miles when the relative humidity is less than 70%		–	–	–	–	–

APPLICABLE ONLY IN THE LAKE TAHOE AIR BASIN

Carbon Monoxide	8 hour	6 ppm (7 mg/m^3)	NDIS	6,670 ug/m^3 (6.0 ppm)	NDIS	–	–	–
	1 hour	–		40 mg/m^3 (35 ppm)				
Visibility Reducing Particles	1 observation	In sufficient amount to reduce the prevailing visibility to less than 30 miles when the relative humidity is less than 70%		–	–	–	–	–

Source: EPA, 1979

NOTES:

[1] California standards are values that are not to be equaled or exceeded. Nevada standards are values that are not to be exceeded where the general public has access.

[2] National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of Hg (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent procedure which can be shown to the satisfaction of the Air Resources Board for California or the Environmental Protection Services for Nevada to give equivalent results at or near the level of the air quality standards may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

[8] Prevailing visibility is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

*Applies only on days when either the California 1-hour oxidant standard or the California 24-hour suspended particulate standard is violated at the sulfur dioxide monitoring location.

Carbon monoxide violations were being reported along the highway 50 corridor in the City of South Lake Tahoe in 1980. The City's deadline for compliance with California standards has been extended by ARB pending the implementation of a transportation plan and other mitigation measures.

An adequate monitoring and testing program for the State's 30 mile visibility standard has not yet been adopted.

The new bi-state compact directs TRPA to adopt environmental thresholds for air quality, and to assure compliance with the most stringent federal, state, and local standards.

The WFRC Environmental Assessment (1979) concludes that "the Lake Tahoe Basin has air quality problems and automobiles are the primary cause. If the problems are to be mitigated and Tahoe's famous clean air maintained, and if vegetation damage is to be halted, particulate concentrations need to be held constant while carbon monoxide and ozone concentrations must be reduced" (page 115).

F. Biota

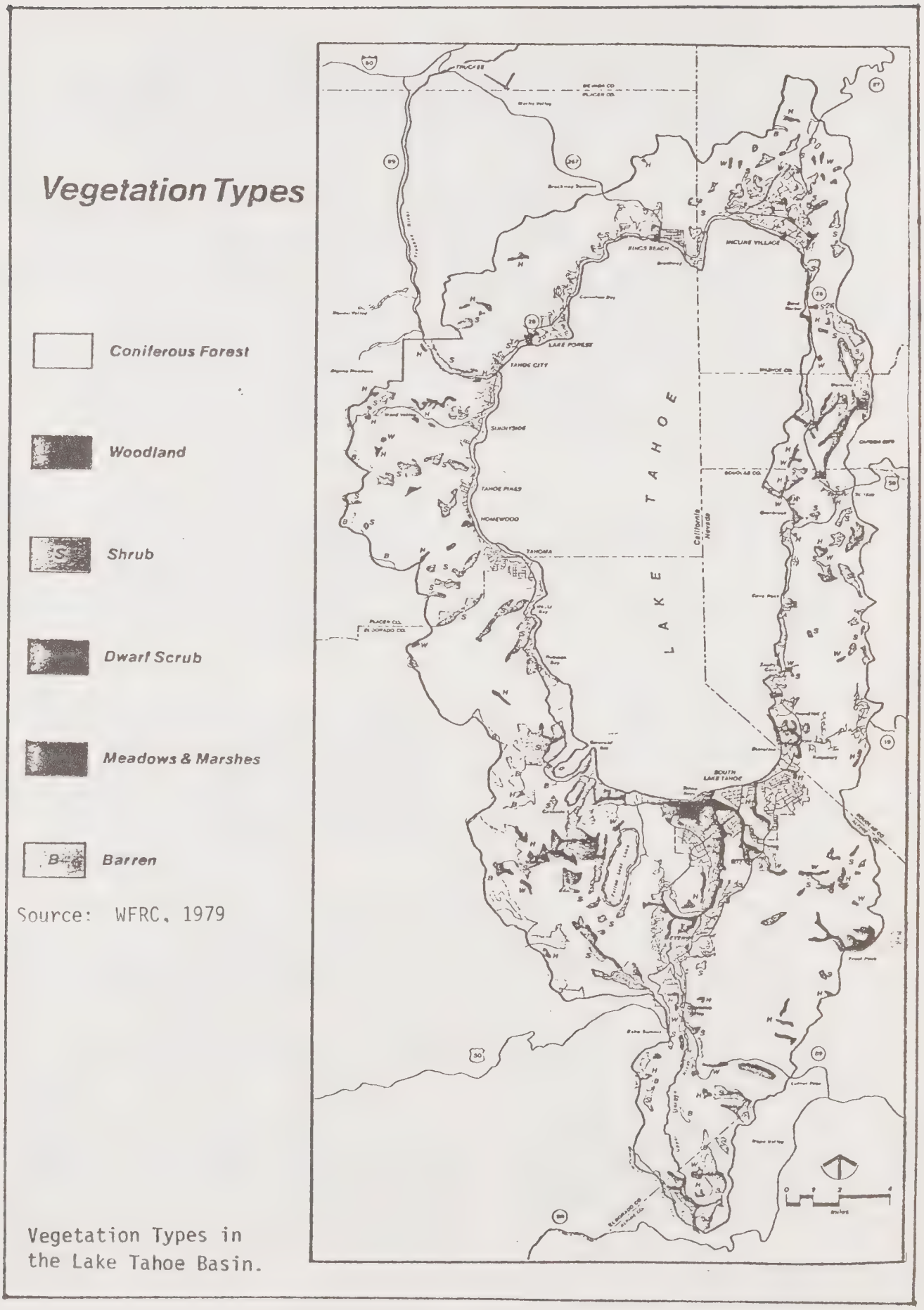
The biological resources of the Tahoe Basin have been discussed in detail in a number of recent reports, several of which include lists of plant and animal species. The discussions in TRPA (1977), Jones and Stokes (1978), EPA (1979), WFRC (1979), and CTRPA (1980b) are incorporated by reference. The summary which follows is based largely on WFRC (1979).

1. Vegetation

At least 160 species of planktonic algae and 87 species of attached algae have been identified in Lake Tahoe (Goldman, 1974, Goldman and de Amezaga, 1975). The lake's exceptional clarity permits enough light penetration for attached algae to grow at depths of up to 400 feet. Higher plants, including mosses and aquatic llowoing plants, are found at shallower depths. The aquatic vegetation of other lakes and streams in the region is less well known (TRPA/U.S. Forest Service, 1971c, 1971d).

There are at least 500 species of native plants in the Tahoe region, and 160 introduced species. The distribution of individual plant species is determined by their tolerance to varying environmental conditions such as elevation, slope, temperature, sunlight, topography, soil, and moisture. Plants with similar environmental tolerances are found in groups called "associations" or "communities". Plant communities of the Tahoe Basin have been classified in several different ways. Figure 17 is a map of these communities according to the classification used by the WFRC (1979).

The most widespread community type of the Basin is coniferous forest, dominated by Jeffry pine at lower elevations and by red fir, lodgepole pine, and mountain hemlock at higher elevations. Hardwoods, including curlileaf mountain mahogany and riparian deciduous forest, occupy only 1% of the Basin's land area, but the latter vegetation type is



Vegetation Types in the Lake Tahoe Basin.

very important for wildlife habitat and preservation of water quality. Shrub communities, including sagebrush and chaparral, are important mainly on the eastern side of the Basin, in areas logged and burned in the 1800's. The dwarf scrub association, consisting of alpine "cushion plants", occurs only on Freel Peak. This is the northernmost alpine communlty in the Sierra Nevada. Marsh and meadow communities are associated with streams, lakes, and areas of high groundwater. Together with riparian deciduous woodlands, they form the vegetation of stream environment zones (SEZ's).

Vegetation is important to the functioning of natural ecosystems in a number of ways. Through photosynthesis, green plants provide energy for the entire ecosystem. Vegetation helps to build soils by adding organic matter, and vegetative cover controls surface runoff and Protects soils against erosion. The soils and vegetation of Sez's provlde natural treatment of water pollutants, and can greatly reduce the amounts of nutrients entering surface waters. Vegetation provides food and shelter for wildlife.

In the absence of human disturbance, changes occur naturally in plant communities, a process called "succession". For example, glacial lakes may gradually fill with sediment and become meadows, and the meadows may eventually be invaded by forest trees. Human disturbance has also affected natural plant communities in the Tahoe Basin, in some cases drastically. This disturbance has included logging, grazing, suppression of wildfires, application of road salts, increase of ozone levels in the atmosphere, and, most importantly, urban development. The WFRC states (page 162): "since 1900, about 15 percent of Tahoe's forests, 5 percent of shrub associations, 35 percent of riparian stream zone, 50 percent of the meadows, and 75 percent of marsh habitat has been lost to urban development. The portion (sic) of these losses that occurred between 1970 and 1978 are about; 6 percent forests; 5 percent shrub; 10 Percent riparian stream zones; 12 percent meadows, and 25 percent marshes".

2. Wildlife

The discussion which follows is taken largely from SWRCB (1980).

Over 300 species of terrestrial vertebrates inhabit the Lake Tahoe region, including 71 mammal species and 204 bird species. Mammals include three species of deer, black bear, mountain lion, and 15 medium-sized furbearers. Larger mammals and furbearers are decreasing in population. Beavers, which were introduced to the Basin in the 1940's, have had locally important impacts on the environment.

Birds in the Tahoe Basin include 22 waterfowl species, ten of which nest in marshlands. Four upland game bird species depend on grassland for nesting and feeding; 86 other bird species require marsh, meadow, or grassland habitats.

Seven amphibian species and 11 reptile species have been identified in the Basin. The amphibians require moist habitats near streams, lakes, and marshes. The most commonly observed reptiles are gopher snakes, which live in dry shrublands, and garter snakes, found in marshes and meadows.

Twelve game fish species and 15 nongame fish species have been identified in Lake Tahoe and its tributaries. Of these 27 species, eight are native, including Lahontan cutthroat trout, mountain whitefish, mountain sucker, Lahontan redside, speckled dace, paiute sculpin, Tahoe sucker, and Tui chub. Introduced game fish are the basis of the region's recreational fishery, and they have had significant impacts on the populations of native species.

Wildlife of the Basin are vulnerable to direct human harvesting (hunting, fishing, trapping), indirect disturbance (as by recreational users of the backcountry), and especially to destruction of habitat by urban development. Stream environment zones have been termed "key wildlife habitat" WFRC, 1979)' Nearshore areas of Lake Tahoe, and tributary streams and marshes, are important spawning and food producing areas for fish. Further development in such areas will significantly affect fish and wildlife.

3. Rare and endangered species

The federal and state governments have officially designated a number of animal species whose ranges include the Tahoe Basin as rare, endangered, or threatened. Private organizations such as the California Native Plant Society have identified other rare species which have not yet received official recognition. The U. S. Forest Service lists a number of "sensitive" animal species, which, while not endangered, are rare in the Tahoe Basin. Table 19 lists "emphasis" species of wildlife in the Basin, and Table 20 lists rare and endangered plant species.

The habitats of two of the endangered plant species, the Tahoe Yellow Cress and Bolander's Mountain Dandelion, are in presently urbanized areas or areas zoned for development. Tahoe Yellow Cress can be found in moist areas between 6000 and 8000 feet, especially near the lake. The U. S. Fish and Wildlife Service (1980) states that this plant is particularly sensitive to damage or loss in areas of intense public beach use, and that it could be adversely affected by changes in lake level, beach grooming, shorezone recreational development, and possibly by water pollution. The habitat of Bolander's Mountain Dandelion is wet meadows in red fir and lodgepole pine forests between 7000 and 9300 feet.

Table 19: Emphasis Species of Wildlife in the Lake Tahoe Basin

Emphasis Category	Emphasis Species
Recovery	
Federal: Endangered	bald eagle, peregrine falcon
State of California: Rare	wolverine
Endangered	bald eagle, peregrine falcon
State of Nevada: Endangered	bald eagle, peregrine falcon
FS: Sensitive	prairie falcon, osprey, spotted owl, goshawk, golden eagle
Harvest	mule deer, black bear, coyote, rabbit, waterfowl
Special Interest	sierra red fox, marten, fisher, mountain lion, flammulated owl, pileated woodpecker

Source: WFRC, 1979

Table 20

RARE AND ENDANGERED PLANT SPECIES
OF THE LAKE TAHOE REGION

Scientific Name	Common Name	Habitat	General Location
VERY RARE AND ENDANGERED PLANTS			
Draba asterophera var. asterophera	Tahoe Draba	Tallus & rock crevices	Southern end of Basin
Draba asterophera var. macrocarpa	Cup Lake Draba	Tallus & rock crevices	Desolation Wilderness
Draba cruciata var. cruciata	Mineral King Draba	Subalpine fir forest	--
Lewisia pygmaea var. longipetala	Longpetaled Lewisia	Alpine fell-fields	--
Rorippa subumbellata	Tahoe Yellow Cress	Moist areas, 6,000-8,000'	Southern and western portions of Basin
Veronica cusickii	Cusick's Speedwell	Lodgepole pine forest & subalpine fir forests	--
RARE AND NOT ENDANGERED PLANTS			
Corydalis caseana	--	Moist shade, yellow pine & red fir forests	--
Haplopappus eximus	--	Granitic soils near treeline	--
Phalacroseris bolanderi	Bolander's Mountain Dandelion	Red fir & lodgepole pine forests, wet meadows	--
Vaccinium uliginosum	Bog Bilberry	Sphagnum bogs	--

Source: TRPA, 1977

Of the endangered animal species, only one, the southern bald eagle, is a known seasonal inhabitant of the Basin; the one known nesting site has been inactive since 1970. Peregrine falcons once nested in the Basin, and occasional migrants have been seen. There have been no wolverine sightings in the Basin for over 20 years.

The Lahontan cutthroat trout, designated "threatened" by the federal government, is now maintained by the Nevada Department of Wildlife in Marlette Lake. The original Lake Tahoe Population of this species is believed to be extinct. The U. S. Fish and Wildlife Service is attempting to restore this fish to its original habitat throughout the Truckee River system. This agency believes that management decisions affecting water quality and water supply in the Tahoe Basin must include consideration of downstream fisheries, and that tributary streams of Lake Tahoe must be preserved as potential spawning and rearing areas for the Lahontan cutthroat trout.

G. Significant Environmentally Sensitive Areas

The TRPA environmental assessment (1977) emphasized that the entire Tahoe Basin is environmentally sensitive, but it designates three particularly sensitive types of area: Unique ecological associations, stream environment zones and related hydrologic areas, and archeological and historical sites. Other reports including detailed discussions of such areas are WFRC (1979), EPA (1979), and Jones and Stokes (1978). All of these reports are incorporated by reference. Fourth and fifth types of sensitive areas have been clearly identified by recent analysis of activities in the Lake Tahoe Basin. These include high erosion hazard lands and sensitive shorezone areas. The State Board's Lake Tahoe Water Quality Plan shows that high erosion hazard lands are most susceptible to impacts which will result in water quality deterioration. In addition, all lands which are developed in excess of land coverage constraints have been shown to have adverse impacts upon water quality. Thus, all lands of the Lake Tahoe Basin become particularly sensitive when developed in excess of land capability coverage constraints.

1. Unique ecological associations

The Environmental Protection Agency's EIS (1979) for south shore wastewater treatment facilities lists the natural communities of the Basin in order of their sensitivity. Of "primary biological significance" are wet meadows, riparian zones, marshes, bogs, deer migration corridors, and areas supporting rare, endangered, or otherwise important species. Of secondary importance are other undeveloped natural communities; of tertiary importance are urban areas which do not impinge on stream environment zones. The EIS also lists specific unique and sensitive areas which have been identified by the California Natural Areas Coordinating Council. These include the Freel Peak alpine plant community, Desolation Wilderness, D. L. Bliss, Emerald Bay, and Sugar Pine Point State Parks, and the sphagnum bogs at Grass Lake and Osgood Swamp. These areas are protected as public lands, but are still vulnerable to disturbance by recreationsl users.

2. Stream Environment Zones and related hydrologic areas

Stream Environment Zones are defined by the criteria in TRPA's "Handbook of Best Management Practices" to include:

* Streams, small lakes, and ponds.

* A buffer strip, 25 to 100 feet on either side of the stream, depending on the magnitude of the stream.

* Wetlands and areas of riparian vegetation.

* Areas with alluvial soils.

* The 100-year flood plain.

TRPA has mapped the stream environment zones of the Basin. The importance of stream environment zones as wildlife habitat has been discussed in part F of this Section. Their importance in the removal of sediment and nutrients form surface runoff was documented by a 1977 Environmental Protection Agency study (Morris et. al., 1980.) which concluded that:

* Stream environment zones where water moves as sheet flow provide effective treatment of surface runoff.

* This natural treatment capability is destroyed in stream environment zones where development causes channelized flow.

* Channelized stream environment zones may actually increase sediment and nutrient loadings in areas where erosion is caused by concentrated runoff.

3. High hazard lands

High hazard lands include high hazard geomorphic groups and high erosion hazard soil types. The following geomorphic units are considered to be high hazard:

A Glaciated granitic uplands
B_1 Glaciated volcanic flowlands undifferentiated
B_2 Rocky ridge lands
C_2 Strongly dissected lands
C_2 Steep strongly dissected lands
C_3 Moderately dissected weakly glaciated lands
C_4 Subalpine rim lands
C_5 Alluvial lands
E_3 Canyon lands
F_1 Escarpment lands
F_2

Generalized maps of these geomorphic units are available for review at the TRPA offices in South Lake Tahoe.

The following soil types are considered to have extremely high erosion hazard:

CaE	Cagwin-Rock outcrop complex, 15 to 30 percent slope.
CaF	Cagwin-Rock outcrop complex,
Co	Celio gravelly loaming coarse sand
Ev	Elmira loamy coarse sand, wet variant
Fd	Fill land
Gr	Gravelly alluvial land
GsF	Graylock extremely stony loamy coarse sand, 30 to 50 percent slope
JwF	Jorge-Tahoma very stony sandy loam, 30 to 50 percent slope
Lo	Loamy alluvial land
Mh	Marsh
MsE	Meeks very stony loamy coarse sand, 15 to 30 percent slope
MsG	Meeks very stony loamy coarse sand, 30 to 60 percent slope
MtE	Meeks extremely stony loamy coarse sand, 15 to 30 percent slope
MtG	Meeks extremely stony loamy coarse sand, 30 to 60 percent slope
MxF	Meiss cobbly loam, 9 to 30 percent
MsF	Meiss cobbly loam, 30 to 50 percent slope
Px	Pits and dumps
Ra	Rock land
RcF	Rock outcrop-Cagwin complex, 30 to 50 percent slope
RcG	Rock outcrop-Cagwin complex, 50 to 70 percent slope
RtF	Rock outcrop-Toem complex, 30 to 50 percent slope
RtG	Rock outcrop-Toem complex, 50 to 70 percent slope
Rx	Rock outcrop and rubble land
ShE	Shakespeare gravelly loam, 9 to 30 percent slope
SkF	Shakespeare stony loam, 30 to 50 percent
Sm	Stony colluvial land
TeG	Tallac very stony coarse sand loam, 30 to 60 percent slope
TmE	Tallac gravelly coarse sand loam, shallow variant, 9 to 30 percent slope
TmF	Tallac gravelly coarse sandy loam, shallow variant, 30 to 50 percent slope
TrE	Toem-rock outcrop complex, 9 to 30 percent slope

TrF Toem-rock outcrop complex,
30 to 50 percent slope
UmF Umpa very stony loam,
30 to 50 percent slope
WaF Waca cobbly coarse sandy loam,
30 to 50 percent slope
WcF Waca-rock outcrop complex
30 to 50 percent slope

Generalized maps of these soil types are available for review in the TRPA offices in South Lake Tahoe.

Development of high hazard geomorphic units and soil types has a tremendous impact upon aesthetics, erosion, vegetation, and water quality.

4. Sensitive Shorezone Areas

The following discussion is taken from SWRCB (1980):

Nearshore waters provide the main visual evidence of water quality degradation to people visiting Lake Tahoe, in the form of sediment plumes and increased attached algal growth. Increases in erosion have a more immediate impact on nearshore waters than on the rest of the Lake because nearshore waters are partially self-contained and the first to receive sediment and nutrients generated in the surrounding Basin.

Construction and dredging in the Lake can cause localized pollution problems by disturbing sediments. Distrubing these sediments increases turbidity and reintroduces nutrients which had settled out of the water. Construction in the Lake may also affect current flow, causing currents to disturb bottom sediments.

Dredged material may be disposed of inside or outside of the Tahoe Basin. If disposal is done improperly, nutrients from these waters could create water quality problems.

The U. S. Fish and Wildlife Service, the California Department of Fish and Game, and the Nevada Department of Wildlife have cooperated in mapping sensitive fish habitats in Lake Tahoe. "Prime fish and aquatic habitat" is found along about 37 miles of Lake Tahoe's shoreline in rocky areas less than ten meters deep. Most of Nevada's shoreline falls in this category. This area is an important fish food producing zone which provides permanent habitat for six fish species and temporary habitat for young fish of most other species in the Lake. "Significant spawning areas", used mostly by non-game fish, which are important as food for game species, are found along about 15 miles of shoreline. Twenty-one of the 63 streams entering Lake Tahoe have been identified as "significant spawning habitat" or "biologically important stream inlets". These areas are important for the reproduction of all game fish species in the Lake except lake trout, and for spawning of some non-game species. In addition, the

inlets provide foraging habitat for several fish species. Shallow waters immediately offshore of where the inlets enter the Lake, as well as the inlets themselves, are important fish habitat. Nearly 70 percent of the nearshore waters in significant spawning areas or prime aquatic habitat are privately owned. The habitat value of these areas may be adversely affected by sedimentation (U. S. Fish and Wildlife Service, 1980).

A study of cumulative impacts of shorezone development at Lake Tahoe Phillips, Brandt, Reddick, McDonald and Grefe, 1978) concluded that maximum buildout of shorezone lots could double the number of piers and marinas in the Lake. A large number of permeable piers cumulatively could result in shoreline erosion or accetion. The report further concluded that "as maximum buildout is approached, shorezone development and expanded recreational use will contribute to incremental degradation of the water at Lake Tahoe." The report recommended further quantitative study of the physical and biological effects of piers. A study of physical effects is now being sponsored by the Calfiornia State Lands Commission.

Construction of piers can involve localized erosion, suspension of bottom sediments, and destruction of valuabe riparian vegetation. Increased boat traffic, boat wakes, and propwash can increase suspended sediments, erode shorelines, and disrupt the behavior patterns of certain fish species.

In recognition of the potential adverse effects of continued proliferation of piers and other mooring structures in Lake Tahoe, the U. S. Fish and Wildlife Service, the California Department of Fish and Game, and the Nevada Department of Wildlife have adopted policies recommending strongly against the approval of new facilities within sensitive fish habitat.

5. Archaeologicial and historical sites

Discussions of the Basin's archaeological and historical resources can be found in TRPA (1977), EPA (1979), and Jones and Stokes (1978). The latter report includes a technical review (Appendix H) of the archaeological literature on the Lake Tahoe region. These sources are incorporated by reference.

The Tahoe Basin provided seasonal hunting, fishing, and food-gathering rounds to Native Americans for centuries before white settlement, the Basin was the seasonal home of the Washoe and Paiute tribes.

Lake Tahoe was discovered in 1844 by the fremont expedition. As trans-Sierra travel routes were established to the north and south of the Lake, way stations, ranches, and dairies grew up in the region to supply travelers. With discovery of the Comstock Lode in 1859, the Tahoe Basin became an important source of lumber for mine

timbers and buildings. The use of the Basin as a summer resort area began in the 1860's, and increased in the 1930's with the pavement of roads in California. In 1945, winter maintenance of roads began, and the development of year-round gaming and winter sports areas in the 1950's and 1960's led to great increases in the numbers of permanent residents and visitors.

Development of the region has destroyed or disturbed many of these sites; a few are protected on public lands. The EPA (1979) EIS concludes that flat areas with good sun exposure and protection from wind, near streams and lakes, are likely sites for undiscovered historical and archaeological resources. Areas of particular concern are the Lake Tahoe Shore where tributaries enter the Lake, the Upper Truckee River Valley, and the Fallen Leaf and Cascade Lake drainages.

SECTION III. DESCRIPTION OF PROJECT ALTERNATIVES

Three general types of actions were considered by the TRPA Governing Board and Advisory Planning Commission (APC) during public hearings held in January, 1981, regarding the proposed amendments to the Lake Tahoe Basin Water Quality Management Plan. These broad classes of actions included retaining the existing TRPA Water Quality Plan, adopting a control strategy which would remain in effect until TRPA adopts regional plan revisions as required by the revised bi-State Compact, and adoption of a permanent control strategy for water quality protection. These broad classes of actions are under consideration for identified problem areas including management of stream environment zones, management of high erosion and high runoff hazard lands, on-site runoff controls and correction of existing erosion and drainage problems.

A. Management of Stream Environment Zones

The alternative management proposals for stream environment zones range from the existing TRPA 208 Plan and implementing ordinances to a complete prohibition of development on parcels containing stream environment zones. The alternative actions evaluated include but are not necessarily limited to the following:

1. Alternative Action 1 - Existing TRPA Plan and Ordinances

The adopted TRPA 208 Water Quality Plan provides for protection of the stream environment zones through land use controls including development review provisions. The ordinance adopting the plan also calls for evaluation of zoning restrictions on 2,090 acres of undeveloped stream environment zones (SEZ's) after plan certification to limit the extent of permitted uses in areas where current TRPA zoning would permit some development.

The existing Plan provides that future development, to the extent possible, will be limited to lands outside the stream environment boundary. The Plan provides for a specific mechanism to identify precisely stream environment zone boundaries, recommends consideration of amendments to zoning classifications, and provides development restrictions for SEZ land in a partially developed state and now zoned for urban uses (4,400 acres referred to as water influence areas). For SEZ areas so designated, the plan calls for construction site preference outside of the identified boundaries and Best Management Practices (TRPA, 1977, Ch. 3, Volume II) if it is impossible to develop the property without encroaching on the stream environment zone.

The existing TRPA Grading Ordinance regulates the extent of permitted development on parcels containing stream environment zones. A permit process is established requiring TRPA review and approval of development proposals (i.e. grading and/or vegetation removal) for all

parcels identified as containing a SEZ. The ordinance permits only construction of one single family dwelling unit, utilities and roadways on parcels containing an SEZ. Specific findings are required prior to issuance of a TRPA administrative permit, including a finding that the construction is outside of the SEZ boundary or that it is a minimum encroachment where sitting outside of the boundary is impracticable. Where encroachment is permitted it must be found that appropriate design measures have been incorporated as part of the development proposal to minimize the adverse effects on the environment.

The existing TRPA Grading Ordinance provides for a variance provision to the grading prohibition and may permit more intense uses of stream environment zones where it is found not to be contrary to the objectives of the ordinance.

2. Alternative Action 2 - Prohibition on SEZ Encroachment and Further Study of Plans for SEZ Management

This alternative action was fully described and documented in TRPA's 1977 draft 208 Plan. The draft Plan recommended that further development (including single family residences) involving encroachment into stream environment zones be temporarily halted pending preparation of detailed plans for their management. The draft Plan also recommended consideration of zoning modification to SEZ lands currently in a natural state and development of an acquisition plan for SEZ lands which were critical to the ability to provide filtration and natural treatment.

This alternative actions would include the following plan elements:

- Temporary restrictions on contruction, grading and vegetation removal within stream environment zones, (capability class 1b) pending adoption of the Agency's regional plan as required under the amendments to the Tahoe Regional Planning Compact. All activities on lots or parcels containing SEZ's would be subject to Agency review and approval. Until adoption of the revised Regional Plan, construction activities within SEZ's will be temporarily prohibited where the construction, grading or new use encroaches within the stream environment zone. Development would be permitted under a TRPA approval, however, when it is found that the construction, grading or use will take place outside of the area delineated as a SEZ according to the guidelines contained in Chapter III of the TRPA Handbook of Best Management Practices. Development would be permitted within SEZ's during this period only where the Agency finds that the project is necessary for completion of regional transportation elements or is necessary for the protection of public health or safety and all other feasible alternatives not involving encroachment have been exhausted.

- Development and analysis of alternative management plans for stream environment zones evaluating the significance of all classes of stream zones, meadows and other riparian areas for protection of water quality and other environmental factors including the value of those lands as wildlife habitat. These detailed plans shall compare the effectiveness of various classes of stream zones considering such factors as slope, vegetation type, potential for overland flow and extent of existing modifications. The management plan will give consideration to the feasibility of restoring the ability of stream zones to provide effective filtration for the protection of water quality, develop specific measures for the protection and enhancement of those areas, will consider the relationship of alternative management proposals to other elements of the Regional Plan, and will be related to a prioritized list of proposed land acquisitions. The management plan will consider all available mechanisms to implement these plans including zoning, and transfer of development rights.

- A process for identifying and recognizing man-modified stream environment zones. The temporary development prohibition described above shall not apply to those SEZ lands which have been modified so substantially as to alter the land capability, soil characteristics, hydrology, geomorphic characteristics and vegetation prior to the effective date of TRPA ordinances. A process and information report outline has been included in Section 8.29 of the TRPA Land Use Ordinance. This process shall be utilized in identifying lands where the development prohibitions do not apply. Future development in these areas will be subject to the mitigation measures identified as part of the process for review of man-modified areas.

- In reviewing development and use proposals during the interim period prior to development of the revised Regional Plan, TRPA shall utilize as a guideline the uses permitted in Table VIII-13, Volume I of the draft Plan (TRPA, 1977). All development and use proposals will conform to the restrictions on land disturbance previously described.

- Existing development approved by previous TRPA or local jurisdiction action will be encouraged to transfer development rights and to lands outside of stream environment zones and which meet the other requirements of these water quality plan amendments. A TRPA ordinance amendment permitting transfer of development rights will be initiated which permits these transfers.

- Amendments to TRPA's Land Use and Grading Ordinances will be required to implement fully these plan elements. However, until adoption of a revised set of TRPA ordinances which

implement these plan amendments and the requirements of the revised Tahoe Regional Planning Compact, the TRPA will only approve of a project after making written findings that the activity is consistent with the TRPA General Plan including the proposed amendments.

- Site review to determine limits of stream environment zones. The TRPA Grading Ordinance sets out the procedures for identifying the limits of a stream environment zone based on a field inspection (conducted according to the guidelines contained in Chapter III of the Handbook of Best Management Practices). All determinations of TRPA staff regarding delineation of the SEZ limits will be subject to an appeal process before the TRPA Governing Board. This case-by-case review permits a verification of the presence of a stream environment zone but would not permit a review of the development restrictions as they would apply to a particular property.

- The Santini-Burton Bill as enacted by Congress requires identification of environmentally sensitive areas which may cause water quality degradation, including stream environment zones. To the extent required by this legislation, TRPA will participate in the identification of these areas which may be included in the acquisition plan required pursuant to federal law.

3. Alternative Action 3 - Permanent Prohibition of SEZ Encroachment

This alternative management proposal would permanently prohibit development which encroaches into stream environment zones. Detailed further assessment of these lands awould not be required since the controls would be placed on a permanent basis. However, consideration of alternative management proposals including transfer of development rights, zoning and acquisition plans would still be required. All other elements of Alternative Action 2 would be applied on a permanent basis.

B. Management of High Hazard Land and High Runoff Hazard Lands

The range of options under consideration as amendments to the TRPA plan include retaining the existing plan, adopting controls to remain in effect until adoption of the revised general plan and adopting a permanent prohibition on development of certain high hazard lands.

1. Alternative Action 1 - Existing TRPA Plan and Ordinances

The existing TRPA Water Quality Plan identified approximately 2,000 acres of land within the Basin classified as high erosion hazard which are zoned for urban use and a total of 5,660 acres of high erosion hazard land which are either partially developed or zoned to permit development. The adopted plan recommended that future development on these lands be subject to the application of the

construction practices contained in the Handbook of Best Management Practices (Vole II). The existing plan concluded that approximately one-half of the field-identified erosion and drainage problems occur as a result of development on high erosion hazard lands.

The existing TRPA Grading, Land Use, and Water Quality Ordinances deal with development practices on high erosion lands. The Land Use Ordinance restricts land coverage to 1% for land capability districts 1a, 1c, and 2 except where specific land coverage over-rides are permitted. Land capability district 3 (high runoff potential) permits 5% impervious surface coverage except where otherwise provided for more intense land coverage.

Existing exemptions from land coverage requirements include allowances for single family lots predating TRPA ordinances, commercial development, public service development, regional roads and facilities and certain residential developments.

The TRPA Water Quality (208) Ordinance requires application of Best Management Practices olume II) on high erosion hazard lands for all new development.

2. Alternative Action 2 - Prohibition and Development Controls on High Erosion and High Runoff Hazard Lands

This alternative action would prohibit development activities on land capability classes 1a, 1c, and 2 until adoption of a revised TRPA Regional Plan as required by the amended bi-state compact. Development on land capability class 3 would be reviewed on a case-by-case basis to permit development consistent with the other requirements of this Water Quality Management Plan.

This alternative action would include the following specific plan elements:

- A prohibition until adoption of a revised regional plan on all grading, land disturbance and construction activities pending completion of detailed management plans for land capability classes 1a, 1c, and 2. Development on land capability class 3 lands would be permitted on a case-by-case basis, where the TRPA determines that water quality will not be adversely affected and that the proposed development is consistent with the other requirements of the Water Quality plan. These prohibitions and controls would not apply to lands within subdivisions approved by TRPA after February 10, 1972 in accordance with the Agency's land capability regulations after and where it is verified that the erosion controls required by such approvals have been properly installed and maintained. Development would also be permitted on land capability classes 1a, 1c, 2 and 3 during this interim period where it is found that the project is necessary for completion of

regional transportation or air quality elements, is necessary for the protection of the public health and saftey, or is necessary for public recreation and all other feasible alternatives not involving construction in these areas have been exhausted.

- Development and analysis of alternative management plans for high erosion and high runoff hazard lands. Such a plan would incorporate appropriate best management practices and evaluate the feasibility of controlling erosion to within acceptable limits for each sub-class of land. This evaluation would include application of land coverage limits imposed by the land capability system.

- A process for identifying and recognizing man-modified areas such as pits and quarries where the proposed development restrictions would not apply. The process and criteria for identification of these types of areas is included in the TRPA Land Use Ordinance. Future development in these areas would be subject to mitigation measures determined as part of the administrative permit process.

- Amendments to the TRPA Land Use Ordinance will be required to fully implement these plan elements. However, the Agency will review applications to ensure consistency with adopted plans in accordance with the requirement of the TRPA Compact amenents.

- The Santini-Burton Bill as enacted by Congress requires identification of environmentally sensitive lands, including high hazard lands which may cause water quality degradation. To the extent required by this legislation, TRPA will participate in the identification of these areas which may be included in the acquisition plan required by federal law.

3. Alternative Action 3 - Permanent Prohibitions on Development of High Hazard and High Runoff Hazard Lands

This alternative management proposal would permanently prohibit development on land capability classes 1a, 1c, and 2. Detailed further analysis of these high hazard lands would not be required since the controls would be placed on a permanent basis. However, consideration of alternative management proposals including transfer of development rights, zoning and purchase proposals would still be required. Development on land capability class 3 would be reviewed on a case-by-case basis while detailed further analysis is conducted and alternative management plans are prepared, as set forth under Alternative Action 2.

C. Land Capability and Coverage Limitations

The range of alternatives actions under consideration for updating the land capability and land coverage requirements of the plan are as follows:

1. Alternative Action 1 - Existing TRPA Plan and Ordinances

The existing TRPA Water Quality Plan does not specifically address land coverage limitations as a mechanism to maintain water quality objectives. However, the TRPA General Plan utilized to a degree the land coverage limitations recommended by the land capability system. Land coverage over-rides of the limits imposed by the land capability system are permitted within the existing TRPA General Plan in some areas such as commercial zoning, public service facilities, single family residences on pre-existing lots, and certain high and medium density residential developments.

The existing TRPA ordinances implement the land coverage limitations generally described under the existing TRPA plan. There are current provisions allowing development coverage to exceed the land coverage recommended under the land capability system for several classes of projects. This includes exceptions provided for in Sections 7.83 (Tourist Commercial Districts), 7.93 (General Commercial Districts), 7.103 (Public Service Districts), 8.24 (Regional Facilities), 8.25 (Administrative Permit for Additional Coverage), 8.28 (Variance), 9.23 (Pre-Existing Lots) and 9.24 (Pre-Existing Lots in Subdivisions).

2. Alternative Action 2a - Controls Imposing Land Capability System on Individual Parcels

This alternative would require future development and construction activities to comply with the recommended limitations of the land capability system on a lot-by-lot basis until adoption of a revised TRPA Regional Plan. Public facilities and improvements not on the property such as subdivision streets would not be included in the land coverage determinations. This alternative would have the following plan elements:

- Limitations on land coverage which eliminate the existing land coverage over-rides included in the existing TRPA Land Use Ordinance. These limitations would only be in effect until completion of an updated TRPA Regional Plan. Permitted land coverage would be calculated using only the parcel or lot area in question and excluding off-site improvements such as public streets or rights of way. Land coverage would be in accordance with the requirements of the land capability system.

- Development of a management plan which specifically identifies existing undeveloped parcels which do not meet land coverage requirements. This plan would identify and assess alternative management proposals for these areas including a full range of options for adequate protection. These could include but would not be limited to more restrictive construction and drainage practices, transfer of development rights, transfer of land coverage from undeveloped areas and lot consolidation to meet coverage requirements.

- Provision for lot consolidation and/or expansion of project area. This would provide a mechanism for meeting land coverage requirements through consolidation of contiguous lands.

- Consideration of transfer of land coverage from noncontiguous lands or from adjacent capability districts. The Agency will consider the water quality impacts of permitting transfer of land coverage from contiguous and noncontiguous lands as part of the Agency's revised Regional Plan.

- Existing non-conforming coverage would be permitted to be replaced pursuant to the requirements of the existing TRPA Land Use Ordinance. This provides for reduction of land coverage according to a prescribed formula.

- A process for precise identification of land capability districts. Challenges to the land capability classification would be determined on a case-by-case basis.

- Exemptions to the land coverage requirements for the following cases:

  - The entire subdivision within which the lot is located conforms to the land capability requirement as a result of application of previous TRPA approvals under the TRPA Subdivision Ordinance.

  - Land coverage for the entire subdivision or planned unit development is scaled down to conform to land capability requirements within the applicable land capability district or on an overall basis.

  - The construction is necessary for completion of an element contained in the Nonattainment Air Quality Plan or there is a demonstration that the project is necessary for the protection of public health, safety or welfare.

- Amendments to the TRPA Land Use Ordinance will be necessary to fully implement these plan elements. However, the Agency will review all development proposals for consistency with adopted plans as required under the TRPA Compact amendments.

- The Santini-Burton Bill as enacted by Congress requires identfication of lands which may cause water quality degradation. To the extent required by this legislation, TRPA will participate in the identification of such areas which may be included in the acquisition plan required by federal law.

3. Alternative Action 2b - Controls Imposing Strict Adherence to Land Capability

This alternative is similar to Alternative Action 2a but would include coverage attributable to off-site improvements such as public streets in existing subdivisions in determining whether total coverage complies with land capability.

4. Alternative Action 3 - Permanent Control Requiring Adherence to Land Capability

This alternative would impose the controls mentioned in either Alternative Action 2a or Alternative Action 2b on a permanent basis. Further study of management proposals would also be necessary.

D. Management of On-Site Runoff

The alternative proposals for management of on-site runoff range from the existing TRPA plan elements to mandatory regulatory controls on all facilities or activities which potentially degrade water quality.

1. Alternative Action 1 - Optional Regulatory Program for On-Site Runoff

The existing TRPA plan identifies a list of specific land use activities that require on-site runoff facilities. This includes parking lots, corporation yards, service stations and other similar facilities which increase runoff volumes and potentially degrade water quality. The existing plan calls for correction of these problems with improved runoff management facilities based on review of development proposals and/or site modification requiring TRPA review. The existing plan also permits the Nevada Division of Environmental Protection and the Lahontan Regional Water Quality Control Board to issue National Pollutant Discharge Elimination System and other Water pollution control orders NPDES permits which regulate runoff from these sites.

The TRPA Water Quality (208) Ordinance provides that the Agency shall review the need for on-site surface water management systems upon application for construction or use permits. On-site surface water management systems may be required as a condition of approval. The 208 Ordinance also adopts the Uniform Regional Runoff Control Guidelines as a basis to assess the effectiveness of these systems.

This alternative provides for an optional regulatory program for implementation of on-site runoff controls at the discretion of TRPA, or at the discretion of the appropriate state water quality agency through the issuance of water quality control orders.

2. Alternative Action 2 - Regulatory Program for On-Site Runoff

Alternative 2 includes a program for correction of existing on-site runoff problems wherever they have been identified. The Nevada conditions of certification of the existing TRPA Water Quality Plan include a requirement that on-site runoff management systems be implemented without waiting for construction or use permits. In addition to the regulatory program provided for through TRPA ordinance

revisions NPDES permits may be issued to require installation of these systems. NPDES permits may be issued where the responsible state water quality control agency finds it is necessary for the protection of water quality. NPDES permits shall be consistent with any regulation or administrative permit of TRPA affecting the property or the class of activities.

E. Restrictions on New Subdivisions

The alternative actions for restrictions affecting new subdivisions range from the existing TRPA plan, which requires consistence with TRPA ordinances and standards, to a permanent prohibition on new subdivisions.

1. Alternative Action 1 - Existing TRPA Plan and Ordinances

The existing TRPA plan utilizes land coverage restrictions and best management practices as the primary methods to regulate degraded water quality which may result from creation of land coverage and disturbance associated with the construction of new subdivisions. However, the revised Tahoe Regional Planning Compact will temporarily halt new subdivisions, planned unit developments or condominium projects until adoption of a revised TRPA Regional Plan or May 1, 1983 (which ever is earlier). The compact revisions will also limit the construction of multiple residential dwellings such as apartments during this time period.

The existing TRPA Subdivision Ordinance sets forth the standards for new subdivisions in the Tahoe Basin. The Subdivision Ordinance requires compliance with the land coverage restrictions previously described. The existing ordinance does not restrict the creation of new subdivisions provided that the subdivision is in compliance with the General Plan.

New subdivisions must provide for adequate drainage, slope stabilization and revegetation and include appropriate measures from the Handbook of Best Management Practices in the project proposal.

2. Alternative Action 2 - Prohibition on Construction of New Subdivisions

Construction of subdivisions not previously approved by TRPA would be prohibited. This prohibition would remain in effect until adoption of the revised TRPA Regional Plan. Consistent with Section VI(C)1 of the revised compact, which creates a special exception to the moratorium in the compact, "subdivision of land owned by a general improvement district, which existed and owned the land before (December 19, 1981) may be approved if subdivision of the land is necessary to avoid insolvency of the district." Approval of a subdivision qualifying for this exception may be granted where it can be demonstrated that water quality objectives will be attained through appropriate mitigation measures or pollution offsets.

3. Alternative Action 3 - Permanent Prohibition on New Subdivisions

Construction of new subdivisions would be permanently prohibited under this alternative action in order to eliminate potential discharges from new development.

F. Management of Erosion and Drainage Problems

The alternatives actions for improved management of erosion and drainage problems range from the existing TRPA plan with no specific implementation schedule to a fixed schedule for remedial measures tied to a regulatory program.

1. Alternative Action 1 - Existing TRPA Plan and Ordinances

The adopted TRPA Water Quality Plan identifies existing drainage and erosion problems. The Plan includes conceptual plans for each drainage within the Tahoe Basin and a prioritization of measures necessary to remedy existing problems. The total cost of remedial erosion and drainage control facilities expressed in 1976 dollars is estimated at $77.9 million. The available resources to implement the plan's recommendation were evaluated and presented as potential funding sources.

The existing Plan identifies the responsible entities for correcting existing problems as either the local jurisdiction, state transportation departments or U. S. Forest Service. The adopted Plan does not include a schedule for implementation of these measures but rather indicates that implementation will proceed based on available resources.

Although no mandatory regulatory programs or implementation schedules were adopted as part of the existing TRPA Water Quality Plan, implementation has proceeded with erosion control work in several areas. This includes the EPA Clean Lakes Grant Programs for Washoe and Douglas Counties, the Nevada Tahoe Conservation District's Critical Area Treatment projects on Kingsbury Grade and at Marla Bay/Zephyr Heights performed under joint agreement with Douglas County. Another notable erosion control project completed in the Tahoe Basin since adoption of the initial plan includes stabilization of the Mt. Rose Highway (Nevada Department of Transportation) under a TRPA administrative permit issued pursuant to the plan.

The U. S. Forest Service's watershed restoration program in the Tahoe Basin was able to compete successfully for increased federal funding, partially as a result of the plan's documentation of the need for remedial erosion control work. This has included watershed programs such as the restoration of the Meyers Landfill, the restoration of the Osgood Swamp, and restoration of the Jennings casino site on Burke Creek. The Lake Tahoe Basin Management Unit of the U. S. Forest Service currently has 17 active watershed programs designed to protect and enhance water quality.

In addition to publicly financed projects, TRPA review of development proposals has required implementation of remedial erosion control and drainage facilities on a routine basis since plan adoption.

The TRPA Water Quality (208) Ordinance indicates that the local jurisdictions shall annually assess the erosion control and drainage projects set forth in the plan and implement those projects as funds are available. The ordinance also specifies that at least one full watershed erosion and drainage project shall be completed and evaluated for its cost effectiveness.

2. Alternative Action 2 - Remedial Measures Constructed on a Phase 20-Year Implementation Schedule

This alternative action would amend the existing TRPA plan by including a 20-year phased implementation schedule for construction as follows:

- The remedial erosion control and drainage projects contained in the TRPA Water Quality Plan will be implemented within a 20-year time frame. Priority listings will be used to assess the relative effectiveness of various proposals but will not be strictly adhered to. The ranking of a project on the priority list will not preclude initiating work which can be incorporated into a higher priority project and can be shown to be effective. Project proposals involving expenditure of public funds will be reviewed by TRPA for analysis of the cost effectiveness of the project.

- Phased implementation of erosion control projects following the priority system developed by the SWRCB (see Table 21, taken from the SWRCB Lake Tahoe Basin Water Quality Plan, (SWRCB, 1980). The implementation program will be broken into four phases as follows:

  - Phase I Program

    This program phase includes priorities 1-4 (see Table 21) which will reduce 52% of the current controllable suspended sediment load from site identified are requiring erosion control projects at an estimated cost of $24.3 million (1979 dollars). Commitments for implementation and construction of the Phase I program will be required under this alternative within five years after plan adoption. Potential funding sources for this program have been analyzed in the existing TRPA Water Quality Plan.

    In addition to those funding sources listed in the previously approved TRPA Water Quality Plan, new potential sources have been made available. The passage of the Santini-Burton Bill authorizes up to 15% of proceeds from land sales in Southern Nevada to be utilized for erosion control work to be allocated to local government jurisdictions in the Tahoe Basin. Based

TABLE 21

EROSION and URBAN RUNOFF CONTROL PROJECTS in the LAKE TAHOE BASIN

COST in 1979 DOLLARS, ESTIMATED ANNUAL SEDIMENT REDUCTION A/

EROSION HAZARD	SLOPES ($22.7 MILLION)	UNVEGETATED AREAS ($1.6 MILLION)	CURBS and GUTTERS ($37.2 MILLION)	DIRT ROADS ($12.5 MILLION)	STORM DRAINS ($20.9 MILLION)
HIGH	PRIORITY 4 $14.7 million 6,030 Tons 0.41 kg/$	PRIORITY 1 $0.9 million 1,650 Tons 1.83 kg/$	PRIORITY 6 $10.2 million 3,730 Tons 0.37 kg/$	PRIORITY 5 $4.6 million 1,310 Tons 0.28 kg/$	PRIORITY 7 $7.1 million 1,150 Tons 0.16 kg/$
MODERATE	PRIORITY 3 $4.7 million 3,160 Tons 0.67 kg/$	PRIORITY 1 $0.4 million 90 Tons 0.23 kg/$	PRIORITY 9 $13.4 million 2580 Tons 0.19 kg/$	PRIORITY 8 $3.2 million 860 Tons 0.27 kg/$	PRIORITY 12 $5.4 million 400 Tons 0.07 kg/$
LOW	PRIORITY 2 $3.3 million 4,020 Tons 1.22 kg/$	PRIORITY 1 $0.3 million 70 Tons 0.23 kg/$	PRIORITY 10 $13.6 million 2,300 Tons 0.17 kg/$	PRIORITY 11 $4.7 million 290 Tons 0.06 kg/$	PRIORITY 12 $8.4 million 410 Tons 0.05 kg/$

TOTAL DOLLARS = $95 MILLION

SEDIMENT REDUCTION = 28,800 METRIC TONS

AVERAGE UNIT SEDIMENT REDUCTION RATE = 0.30 kg/$

A/ Soil loss estimates include sheet, rill, and gully erosion.

Source: SWRCB, 1980

on authorized levels of appropriations, this would generate up to $9.0 million in erosion control and drainage funds available through Federal fiscal year 1985, although these funds could also be utilized for other purposes included in the Act. Additional amounts up to $3 million would also be available for erosion control in this time period on time period on National Forest lands. The SWRCB and California Department of Transportation will commit $10 million and $7.8 million, respectively, for erosion control and drainage improvements. Additional commitments from EPA Clean Lakes Grants and the Soil Conservation Service's Small Watershed and Resources Conservation and Development Programs may be used to supplement these available resources. Local governments and the Nevada Department of Transportation will be requested to participate further financially in these programs utilizing state and local funds or through in-kind services for engineering, design, or construction administration to help meet matching requirements for federal and state grant programs.

If sufficient resources are not made available through the programs listed above to initiate and ensure completion of Phase I projects within a 5-year time frame, TRPA proposes to utilize regulatory programs to ensure compliance with the objectives established by this plan. However, given the potentially available resources and the support for erosion control projects, it is unlikely that these controls will be necessary.

TRPA will initiate a program to identify and secure funding necessary to complete Phase I projects upon adoption of this Plan. Prior to adoption of the environmental threshold limitations required by the revised bi-state compact, or within 12 months from the adoption of the plan, TRPA will review commitments and progress towards Phase I implementation and, if necessary, adopt regulations requiring compliance with erosion control work required by the plan. Local government jurisdictions will be strongly encouraged to utilize funds to be made available under the Santini-Burton Bill for erosion control projects.

Completion of Phase I projects will be incorporated as part of the water quality program included in an interim period prior to development of an updated TRPA Regional Plan. The Updated TRPA General Plan will assess the effectiveness of proposed programs and adjust later implementation schedules as necessary.

- Phase II Program

Program Phase II includes priority levels 5-8 and would reduce the cumulative controllable urban suspended sediment

yield from problem sites by 77% at an estimated cost of $14.9 million (1979 dollars). Phase II is scheduled for implementation in the second five-year period following plan adoption.

- Phase III Program

  Program Phase III incorporates priority levels 9-10 and is projected to reduce the controllable suspended sediment contribution by 94% at an estimated cost of $27 million. Implementation is scheduled for the third five-year period following plan adoption.

- Phase IV Program

  The final phase of erosion control work is scheduled for the fourth five-year period following plan adoption. This phase is the least cost effective involving expenditure of 20% of the total erosion control expenditures for an estimated 6% reduction in controllable urban suspended sediment contributions from sites identified as requiring projects. The later phases of erosion control work will be continually assessed against other available technology to improve water quality for cost effectiveness prior to implementation. Phase IV is scheduled for completion during the final five-year period of the 20-year implementation schedule.

- A regulatory program requiring implementation of remedial erosion control projects will be instituted if commitments for remedial measures lag behind the proposed schedule and would not ensure completion of each program phase. The National Pollutant Discharge Elimination System (NPDES) may be utilized to schedule completion of work contained within Phase I provided the appropriate state water quality agency finds that it is necessary to ensure completion of erosion control work contained in Phase I.

- An offset policy requiring substantial commitments for construction of remedial erosion control works prior to permitting new development otherwise permitted by the proposed Plan amendments will be developed within 12 months of Plan adoption. The goal of the offset policy is to ensure that the limited surface erosion which will take place as a result of permitted development will not exceed gains in sediment reductions anticipated as a result of placing remedial erosion control projects on line. Erosion control projects initiated since the 1978 adoption of TRPA's Water Quality Plan will be considered as part of the offsetting pollution abatement in development of the final policy.

3. Alternative Action 3 - Regulatory Program Tied to Full 20-Year Implementation Program

Alternative Action 3 would utilize the same priority system and schedule as Alternative Action 2 but would also include a mandatory

regulatory program which would be utilized to ensure that each program phase is completed according to the implementation schedule. NPDES permits or other similar programs would be required (as opposed to optional) to gain compliance with the implementation of all phases of the remedial erosion control program.

G. Forest Practices

The alternatives action for improved forest practices range from the existing TRPA plan to a strengthened program with mandatory controls on forest lands.

1. Alternative Action 1 - Existing TRPA Plan

The existing TRPA plan and ordinances rely on the recommendations of TRPA's Handbook of Best Management Practices to control water quality problems on forest lands including recommendations for timber harvesting, ski areas, off-road vehicular use, livestock confinement and golf courses. The recommendations of the Handbook of Best Management Practices are considered as guidelines in reviewing development proposals. The recommendations are designed to adequately protect water quality as a result of uses on forest and undeveloped lands. The TRPA Tree Conservation and Timber Harvesting Ordinances provide further development controls. Under existing TRPA ordinances, a development, timber harvest or use proposal must be initiated prior to applying the Best Management Practices to a particular area.

2. Alternative Action 2 - Specific Best Management Practices Implementation

The recommendations of the Handbook of Best Management Practices would be implemented for existing water quality problem areas on forest lands without requiring a development or use proposal which requires TRPA review. TRPA's land use controls may be utilized to require correction of these problem areas where implementation of corrective measures has not proceeded on a timely basis. The U. S. Forest Service, Lake Tahoe Basin Management Unit, would retain primary responsibility for implementing remedial measures on public lands. In addition to the existing requirements of the Agency's Handbook of Best Management Practices (Volume II), the following plan elements would be included:

- Best Management Practice (BMP) XIIA as contained in Volume II will be used as a guideline for livestock confinement activities.

- BMP XIIB (Volume II) will be used as a guideline for ski area development.

- BMP XIIC (Volume II) will be used as a guideline for golf courses. This inlcudes limitations on the application of fertilizers and a prohibition of use of fertilizer of the fast release variety.

- BMP XIID (Volume II) will be used as a guideline for logging operations. In addition, timber harvesting activities will

prohibit clear cut logging operations. Selective harvest techniques will be utilized except for removal of insect infected or diseased trees necessary to maintain the health and diversity of the timber stand.

- BMP XIIE (Volume II) will be utilized as a guideline for off-road vehicular use. The Agency will designate areas closed and restricted to off-road vehicular use in coordination with the U. S. Forest Service. The Agency will evaluate an ordinance restricting off-road vehicular use as part of its revised Regional Plan.

- Revegetation, resurfacing or other measures to control erosion from dirt roads on forest lands will be consistent with the recommendations of the Handbook of Best Management Practices.

The alternative actions described above could be combined into several alternative plans (Table 22).

Table 22: REVISED TRPA LAKE TAHOE WATER QUALITY PLAN
ALTERNATIVE PLANS AND ALTERNATIVE CONTROL ACTIONS

Control Actions / Alternative Plans	Alternative 1 Existing	Alternative 2A Proposed	Alternative 2B Strict Land Capability	Alternative 3A Permanent	Alternative 3B Strict Permanent
A. Management of Stream Environment Zones	Action 1. Existing Plan & Ordinances	Action 2. Prohibition	Action 2. Prohibition	Action 3. Permanent Prohibition	Action 3 Permanent Prohibition
B. Management of High Hazard and Certain Low Hazard Lands	Action 1. Existing Plan & Ordinances	Action 2. Prohibition	Action 2. Prohibition	Action 3. Permanent Prohibition	Action 3. Permanent Prohibition
C. Land Capability and Coverage Limitations	Action 1. Existing Plan & Ordinances	Action 2a Individual Capability	Action 2b Overall Capability	Action 3a Permanent Individual Capacity	Action 3b Permanent Overall Capacity
D. Management of On-Site Runoff	Action 1. Optional Program	Action 2. Regulatory Program	Action 2. Regulatory Program	Action 2. Regulatory Program	Action 2. Regulatory Program
E. Restrictions on New Subdivisions	Action 1. Existing Plan & Ordinances	Action 2. Prohibition	Action 2. Prohibition	Action 3 Permanent Prohibition	Action 3. Permanent Prohibition
F. Management of Erosion and Drainage Problems	Action 1. Existing Plan & Ordinances	Action 2. Remedial Program	Action 2. Remedial Program	Action 3. Regulatory Program	Action 3. Regulatory Program
G. Forest Practices	Action 1. Existing Plan	Action 2. Specific BMP's	Action 2. Specific BMP's	Action 2. Specific BMP's	Action 2. Specific BMP's

SECTION IV. DESCRIPTION OF THE PROPOSED ACTION

A. Surface Water Management Solutions

Surface water management problems and alternative solutions have been outlined in the existing TRPA Water Quality Plan (TRPA, 1977). The following amendments are recommended to be incorporated into the plan.

1. Management of Stream Environment Zones

The plan is proposed to be amended by incorporating Alternative Action 2 (Prohibition on Stream Environment Zone Encroachment and Further Study of Stream Environment Zone Management until adoption of a revised TRPA Regional Plan pursuant to the revised bi-state compact) as described in Section III-A of this document.

2. Management of High Erosion Lands

The plan is proposed to be amended by incorporating Alternative Action 2 (Development Prohibitions on High Hazard Lands and case-by-case review on High Runoff Hazard Lands until adoption of a revised TRPA Regional Plan pursuant to the revised bi-state compact) as described in Section III-B of this document.

3. Compliance With the Land Capability System

The plan is proposed to be amended by incorporating Alternative Action 2a (Controls Imposing Land Capability System on Individual Parcels until adoption of a revised TRPA Regional Plan pursuant to the revised bi-state compact) as described in Section III-C of this document.

4. Management of On-Site Runoff

The plan is proposed to be amended by incorporating Alternative Action 2 (Regulatory Program for On-Site Runoff) as described in Section III-D of this document.

5. Restrictions on New Subdivisions

The plan is proposed to be amended to incorporate Alternative Action 2 (Prohibition on Construction of New Subdivisions until adoption of a revised TRPA Regional Plan pursuant to the revised bi-state compact) as described in Section III-E of this document.

6. Management of Erosion and Drainage Problems

The plan is proposed to be amended to incorporate Alternative Action 2 (Remedial Measures on a Phased 20-year Implementation Schedule) as described in Section III-F of this document.

7. Forest Practices

The plan is proposed to be amended to incorporate Alternative Action 2 (Specific BMP Implementation) as described in Section III-G of this document.

B. Amendments to Institutional and Regulatory Actions

Modifications to the existing TRPA Water Quality Plan will be necessary in order to carry out the recommended modifications.

The institutional program in the existing plan relies on existing authorities and focusing the activities of overlapping governmental entities into a unified and coordinated program. Defined management and planning functions of the existing TRPA Water Quality Plan are summarized in the Approved Plan Summary (TRPA, 1977). These management and planning functions are presented in Table 23. The existing TRPA institutional program for implementation and continuing water quality is proposed to be retained except as otherwise required to implement provisions of the proposed alternative as discussed in Section III of this EIS.

1. Regulations and Enforcement

As previously outlined, complete implementation of the recommended plan elements will require modifications to existing TRPA ordinances. Since the revised Compact will require a revised TRPA Regional Plan prior to June 19, 1983, it is recommeded that an interim set of ordinances to implement the plan amendments and the requirements of the Compact be initiated simultaneously. These ordinances would only remain in effect until adoption of the revised Regional Plan.

The plan will continue to rely primarily on enforcement of best management practices by local jurisdictions for construction and land use activities which conform to the recommendations of this plan. TRPA will maintain oversight responsibilities for enforcement of best management practices. Assistance will be requested for enforcement of the plan elements as noted in Table 23.

2. Project Review

Development proposals will continue to be reviewed for incorporation of best management practices as required under the existing TRPA Plan. However, the proposed plan revisions will require an expanded

Table 23

LAKE TAHOE BASIN WATER QUALITY MANAGEMENT PLAN
IMPLEMENTATION PROGRAM[1,2]

Plan Element (Agency Responsibility)	Section of 40 CFR 131.11 Addressed	Management Agency (ies)	Major Near-term Actions & Financing Program[3]	Agency (ies) with Final Review and/or Enforcement Authority
Municipal Wastewater Treatment System Needs	h			
201 Facilities Planning	h.2*iii*	Sewerage Agencies	Actions as defined in the state Basin Plans and project lists, will be completed.	CSWRCB/LRWQCB, NDEP, TRPA[4]
Review & Approval of Facilities Plans	h.2*iii*	CSWRCB/LRWQCB, NDEP, TRPA[4]	Existing review procedures will be utilized.	
System Design, Construction, Operation, & Maintenance	h.2*iii*	Sewerage Agencies	Existing operation & financing procedures will be utilized.	CSWRCB/LRWQCB, NDEP, TRPA[4]
Surface Water Management System Needs	j.2			
Facilities Planning	j.2	Local Agencies, State Agencies, USFS[5]	In accordance with the approved schedule, facilities plans and design will be prepared using any available source of funds.	CSWRCB/LRWQCB, NDEP, TRPA[6]
Review & Approval of Facilities Plans	j.2	CSWRCB/LRWQCB, NDEP, TRPA, USFS	As prepared & submitted, facilities plans will be reviewed by the states and by TRPA for concurrence with the 208 Plan.	[6]
System Design, Construction, Operation, & Maintenance	j.2	Local Agencies, State Agencies, USFS[5]	Existing construction and operational procedures will be utilized and will be financed from any available funding sources.	CSWRCB/LRWQCB, NDEP, TRPA[6]
Land Purchase Needs & Financing	j.2	USFS, any appropriate state agencies, local and private agencies	Funds will be allocated in the 1978-79 USFS Budget for Purchase of some Critical Environmental Areas.	

Source: TRPA, 1977

Table 23 Continued

Plan Element (Agency Responsibility)	Section of 40 CFR 131.11 Addressed	Management Agency (ies)	Major Near-term Actions Financing Program[3]	Agency (ies) with Final Review and/or Enforcement Authority
Control of Other Nonpoint Pollution Sources	j			
Livestock Confinement Facilities & Grazing Lands	j.3i	USFS, CD, Appropriate Local & State Agencies	Actions will be instituted in accordance with specific findings of the Continuing Planning Process.	TRPA, USFS, CSWRCB/LRWQCB, NDEP, and other appropriate state agencies
Silvaculture	j.3ii	USFS, CD, Appropriate State Agencies		
Construction Activities	j.3vi	Local Agencies, TRPA, USFS		
Hydrologic Modifications	j.3vii	Local Agencies, TRPA, USFS, Corps of Engineers		
Solid Waste Management Systems	k			
Facilities Planning & System Design	k	Local Agencies	(Same note as above.)	California State Solid Waste Management Board, CSWRCB/ LRWQCB, NDEP, TRPA, EPA
Operation	k	Franchised Refuse Cos.	Existing contractural arrangements will be reviewed and amended as required.	Local Agency Franchisers
Urban & Industrial Stormwater Needs	l			
Facilities Planning	1.3	Local Agencies, State Agencies, USFS	[7]	LRWQCB, NDEP, TRPA, USFS (on Federal lands)[6]
System Design, Construction, Operation, & Maintenance	1.3	Local Agencies, State Agencies, USFS	[7]	LRWQCB, NDEP, TRPA[6]
Regulatory Program	e & n			
Adoption of BMP	n.2	Local Agencies, CD, TRPA, USFS, LRWQCB, NDEP	Within a year of Plan adoption BMP will be adopted & required for all permit approvals.	

Table 23 Continued

Plan Element (Agency Responsibility)	Section of 40 CFR 131.11 Addressed	Management Agency (ies)	Major Near-term Actions Financing Program[3]	Agency (ies) with Final Review and/or Enforcement Authority
Enforcement of BMP	n.2	Local Agencies, TRPA, USFS	Existing inspection & enforcement procedures will be utilized, supplemented by additional staff and financed by increased filing fees.	LRWQCB, NDEP, USFS
Adoption of Runoff Quality Guidelines	n.2	Local Agencies, TRPA, USFS	Adoption within a year of Plan adoption.	LRWQCB, NDEP,
Adoption & Enforcement of NPDES Permits and/or Waste Discharge Requirements	n.1	SWRCB/ LRWQCB, NDEP	Existing Budgeting & administrative procedures will be utilized.	EPA (Final review & approval only)
Adoption & Enforcement of Water Quality Standards or Objectives	e	SWRCB/ LRWQCB, NDEP	Existing Budgeting & administrative procedures will be utilized.	EPA (Final review & approval only)
Project Review	n.1	Local Agencies, TRPA, USFS	Revision to the project review process, formalization of the DRC, and procedures for issuance of building permits will be instituted within one year of Plan adoption.	Local Agencies, TRPA, USFS
Issuance of Construction Permits	n.1	Local Agencies, TRPA, USFS	Revision to the project review process, formalization of the DRC, and procedures for issuance of building permits will be instituted within one year of Plan adoption.	TRPA, USFS (Federal lands only)
Protective Zoning & Ordinances	n.1	Local Agencies, TRPA, USFS	Zoning & ordinance revisions to protect SEZ's and high hazard lands will be instituted within one year of Plan adoption.	TRPA, USFS (Federal lands only)
Water Quality Monitoring	n			
Surveillance for compliance with Construction Permit Conditions	n.1	Local Agencies, TRPA, USFS	To be instituted as permits are issued and financed by the permittee.	
Self-monitoring or surveillance for NPDES or Waste Discharge Permit Compliance	n.1	LRWQCB, NDEP	To be instituted as permits are issued and financed by the permittee.	EPA

Source: TRPA, 1977

FOOTNOTES FOR TABLE 23

[1] Definitions for all agency names used in this table are shown on the following page. Management agencies, as identified in column 3, are those agencies with the primary responsibility for completing the specified Plan Element. Agencies identified in column 5 have the authority to complete the specified function and will utilize that authority if a management agency is either incapable or fails to act in an acceptable manner.

[2] The existing authorities of agencies identified on this table are adequate to provide the specific defined functions. No special authorities will be required and no existing agency authorities are eliminated by the implementation program defined herein.

[3] Near-term actions are defined herein to be those actions expected for Plan implementation within the two-year period following Plan adoption.

[4] Primary responsibility for review and approval of facilities plans and design will be with the NDEP and CSWRCB/LRWQCB. TRPA will provide the existing function of project review for compliance with TRPA ordinances and issuance of a construction permit and to review 201 grant applications for consistency with the 208 Plan as now exercised within the A-95 Clearinghouse function.

[5] The Tahoe Resource Conservation District and/or the Nevada Tahoe Conservation District, through staff support provided by the US Soil Conservation Service, may be requested by these agencies to provide this function.

[6] The funding agency, if Federal or State grants or other funding sources are utilized, may have final review and approval authority as specified in the regulations of a specific funding program.

[7] Near-term actions for management of urban and industrial stormwater are addressed under j.2, Surface Water Management System Needs.

Definition of Terms used in Table 23

Sewerage Agencies-South Tahoe Public Utility District, North Tahoe and Tahoe City Public Utility Districts, Tahoe-Truckee Sanitation Agency, Incline Village General Improvement District, and Douglas County Sewer Improvement District No. 1.

CSWRCB-California State Water Resources Control Board.

LRWQCB-California Regional Water Quality Control Board, Lahontan Region.

NDEP-Nevada Division of Environmental Protection.

TRPA-Tahoe Regional Planning Agency. This notation also includes the California Tahoe Regional Planning Agency and the Nevada Tahoe Regional Planning Agency.

EPA-U. S. Environmental Protection Agency.

Local Agencies-City of South Lake Tahoe, El Dorado County, Placer County, Washoe County, Carson City and County, and Douglas County. This reference also includes appropriate departments within each agency such as public health, and agriculture.

State Agencies-the California Department of Transportation, the California Department of Parks and Recreation, the Nevada Division of Highways, and the Nevada State Park System or any other state agencies that own or manage property in the Basin.

USFS-U. S. Forest Service, Lake Tahoe Basin Management Unit.

Conservation District (CD)-The Tahoe Resource Conservation District, the Nevada Tahoe Conservation District, and the staff support provided by the US Soil Conservation Service.

Franchised Refuse Companies-South Tahoe Refuse Company, Tahoe City Disposal Company, King's Beach Disposal Company, Independent Sanitation Company, and Reno Disposal Company.

Development Review Committee (DRC)-

US Forest Service (USFS)
US Soil Conservation Service
California Regional Water Quality Control Board, Lahontan Region (LRWQCB)
Nevada Division of Environmental Protection (NDEP)
California and Nevada Departments of Fish and Game
California and Nevada Division of Forestry
All Local Agencies
Tahoe Regional Planning Agency (TRPA)

review and regulatory program for on-site runoff problems as described in the recommended plan amendments. This plan element is required in order to meet Nevada's conditions of certification.

3. NPDES Permits

The existing TRPA Water Quality Plan recognizes the authority of the Nevada Division of Environmental Protection and the Lahontan Regional Water Quality Control Board to issue National Pollutant Discharge Elimination System (NPDES) permits to control erosion and runoff. The Nevada Division of Environmental Protection has issued NPDES permits for casino parking lots, using the Uniform Regional Runoff Control Guidelines in the TRPA Water Quality Plan as a basis for permit requirements. Under the recommended plan amendments, NPDES permits may be issued where the responsible state water quality control agency finds it necessary for the protection of water quality. These NPDES permits may set conditions requiring compliance with Best Management Practices or other control measures in the amended Water Quality Plan.

C. Financial Program Amendments

The existing estimates of implementation costs and schedules for implementation will need to be updated to reflect current costs. The financial program recommendations of the existing TRPA Plan will also be amended to incorporate the revised implementation schedule for remedial erosion and drainage control projects recommended by the plan. Specific enforceable goals are to be established for the Phase I work to be accomplished under the plan's recommendations.

SECTION V. ENVIRONMENTAL IMPACTS OF PROPOSED PLAN

A. Requirements of Bi-State Compact on Impact Analysis

Article VII of the revised bi-state compact requires environmental impact statements prepared by TRPA to include:

- the significant impacts of the project
- significant unavoidable adverse impacts
- alternatives to the project
- mitigation measures to be implemented to be sure that the standards for the region are met
- the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity
- significant irreversible and irretrievable commitments of resources involved in the project
- the growth-inducing impacts of the project

This EIS analyzes the general impacts of amendments to TRPA's proposed Water Quality Plan and implementing ordinances, which will lead to changes in the distribution of permitted development, and to the implementation of erosion and runoff control projects. It does not address the impacts of permitting more development than now exists in the Tahoe Basin, since the amount of development to be allowed over the effective period of the project is specified in the bi-state compact. However, it must be recognized that any new development will have significant environmental impacts. The specific impacts of individual projects permitted under the amended Water Quality Plan and ordinances will receive separate environmental analysis by TRPA and other regulatory agencies at the time that they are proposed.

The original TRPA Water Quality Plan included an environmental analysis volume which focused largely on the impacts of remedial erosion and drainage control projects. The socioeconomic and environmental impacts of various levels of development restrictions and remedial control measures were thoroughly analyzed in the SWRCB Water Quality Plan (1980). The EIR for the CTRPA (1980) Regional Plan Update also addressed the impacts of restrictions on development for the protection of the environment. The "impacts" sections of these reports are incorporated by reference.

The discussion of impacts which follows considers "baseline" conditions to be those permitted by existing TRPA plans and ordinances, but it should be recognized that the existing regulations of CTRPA, and the SWRCB, which apply to the California side of the Basin, are more stringent than TRPA's "baseline" conditions.

B. Discussion of Potential Impacts

1. Land, geology and soils

The prohibition of development on high erosion hazard lands should reduce the exposure of people and property to geological hazards (i.e., landslides and earthquakes), and should reduce the rate of soil loss within the region.

The installation of storm drains, gutters, and drainage control structures will require soil disturbance, and some erosion control projects will require regrading of oversteepened slopes to achieve soil stability. Although best management practices (BMP's) will be used to ensure that soil disturbance is temporary, storms during the building season could cause some erosion from construction sites. Excavated soil and other construction debris will need to be disposed of. The amount of permanent soil disturbance permitted in the Basin under the proposed alternative will be less than that permitted under existing plans and ordinances, because of stricter adherence to the land capability system.

2. Land Use

Existing zoning designations and existing land use are summarized in Table 4 (Section II). None of the alternatives discussed would immediately affect the overall zoning designations presently adopted within the Lake Tahoe Basin under TRPA plans and ordinances. Such changes in zoning may be part of the TRPA Regional Plan revision process scheduled to be completed in 1983. The proposed alternative would, however, lead to temporary, and possibly to permanent changes in rules that govern the intensity of new development within presently adopted zoning districts. Additional standards would apply to fragile lands limiting their potential development. Because the maximum amount of development to be allowed over the effective period of the proposed alternative is specified by the revised bi-state compact, it can be expected that the Water Quality Plan amendments will affect the distribution of development without significantly affecting the total amount of development. Given the same overall level of development activity, the current amount of buildout in fragile areas would not be increased, whereas high capability lands would develop more rapidly than would occur under existing controls. The map in the pocket in the back of this EIS depicts the general location of major stream environment zones (as reflected by the delineation of 1b lands) and high erosion hazard lands. Under the proposed alternative further development in these areas would be prohibited until adoption of a new TRPA Regional Plan. In addition development would be temporarily prohibited and/or restricted in many areas of moderate and low erosion hazard lands where proposed construction could not be accomplished in conformance with applicable land coverage constraints. More detailed maps of stream environment zones and high erosion hazard lands are available at TRPA's offices.

The California State Water Resources Control Board's Lake Tahoe Basin Water Quality Plan (SWRCB, 1980) also contains generalized maps between pages 120 and 121 showing:

- area outside of existing development (unsubdivided lands)
- stream environment zones
- low capability lands (classes 1, 2, 3)
- high capability lands (classes 4, 5, 6, 7)
- substandard areas (where individual lots cannot be constructed upon within land capability coverage constraints)

Finally, the TRPA's Draft Water Quality Plan (TRPA, 1977) depicts the location of stream environment zones, high erosion hazard lands, moderate erosion hazard lands, and low erosion hazard lands. In the proposed alternative, review of proposed development projects would include on-site inspection by TRPA or other permitting agencies to verify the land capability conditions indicated on these maps.

In most instances high capability lands are located within or adjacent to the central urbanized areas. By directing development onto these high capability lands, the proposed controls would have the incidental impact of concentrating new growth. This effect will have what may be considered the negative aspect of making developed areas appear more intensely "urban", and thus increasingly out of character with the small-scale, mountain rural atmosphere associated with Tahoe in its pre-1950's history. However if the new increment of growth is a "given", a pattern of concentrated as opposed to scattered growth has significant benefits and efficiencies. Concentrated growth capitalizes on the available capacities of existing service systems (such as schools, sewage lines, snow removal) rather than requiring their extension or proliferation. Effective transit systems and other modes of transportation become more feasible, having secondary benefits on air quality and moderating the increase in traffic congestion. The value and integrity of undeveloped fragile lands for wildlife habitat, recreation and scenic areas are maintained. Since floodplains comprise a large portion of stream environment zones, restrictions on SEZ developemnt would avoid flood hazards to people or property that would otherwise be created. The secondary effects of the proposed new development pattern are further discussed in the following sections.

The proposed short-term restrictions on development will preserve long-term options for land use planning until environmental threshold carrying capacities are determined.

As previously noted, controls similar to those in the proposed TRPA 208 revisions have recently been adopted by CTRPA and the SWRCB, and the contemplated changes in land use patterns could be expected in California whether or not TRPA adopts the proposed alternative. In this regard the proposal and its impacts are "new actions" only for Nevada.

The proposed alternative, implementing the controls only until a new TRPA Regional Plan is adopted, would affect the approximately 3700 residential lots and 456,000 square feet of commercial building that would be allowed by the bi-state compact over the scheduled two and one-third years of Regional Plan preparation. The magnitude of the "shift" of development from low to high capability lands under alternatives 2 and 3 can be estimated from past trends.

In recent years approximately one-half of the residential development in California and 60% in Nevada has taken place on the types of land that would be restricted under the proposed action. Commercial building has generally been more concentrated on higher capability lands. An estimated 2000 residential units (500 acres) and 100,000 square feet (2.3 acres) of commercial building area would be developed on fragile lands if TRPA's existing plans and ordinances governed construction. Under the proposed alternative, this development would instead be located on high capability land, along with the remaining balance of the development permitted by the revised TRPA compact. This shift can be compared to the approximately 10,000 acres of low erosion hazard lands already urbanized (Table 15). Under Alternative 3, making the controls permanent, all new development would be limited to high capability lands. If all high capability lots were permitted to develop as single family units over time, approximately 10,000 new units would be constructed, producing a perceptible increase in intensity of urbanized areas at buildout.

If development is limited in the Basin, increasing casino and tourist related employment could combine with high demand for available housing and with rising housing prices to create spillover of housing demand to adjacent areas outside the basin. This issue is discussed in greater detail in the SWRCB Water Quality Plan (page 220). The proposed alternative does not directly limit the level of development permitted in the Basin; such limits are imposed by the revised bi-state compact. The proposed alternatives will direct the development which does take place to less environmentally sensitive areas. Under alternative 2 all the development permitted under the compact over the next two and one-third years could be accomodated on high capability lands. The proposed alternative should not create spillover beyond that which may be caused by the compact limitation itself. Under alternative 3 the supply of undeveloped high capability lands would be exhausted at some point in the future, and spillover may occur if demand remains high and existing areas are not redeveloped at higher intensity. Spillover could also occur if remedial projects sufficient to offset the sediment produced by new development are not built, and further development is consequently prohibited. This circumstance is unlikely, however, since the increment of new sediment production associated with new development under the proposed alternative is a small fraction of the existing sediment loads, and the remedial projects already completed or programmed for state and federal grants would achieve a reduction greater than the required offset (see, also, Water Quality Impacts below).

3. Planning

Amendments to the existing TRPA Water Quality Plan will require changes in the implementing ordinances, to be effective until the adoption of a new Regional Plan in 1983. These may lead to corresponding changes in county and city plans and ordinances. The designation of TRPA as the 208 planning agency for the Basin will lead to changes in the presently proposed implementation of the SWRCB Water Quality Plan by the California Regional Water Quality Control Board, Lahontan Region, including the transfer of Phase IV 208 planning responsibility.

"Spillover" development in neighboring areas that may occur if development restrictions in the Tahoe Basin are made permanent, as provided in Alternative 3, may require changes in the plans and zoning of other counties and cities.

4. Population, Housing and Economy

a. Development Potential

The five alternatives impose different levels of constraint upon development in the region and would result in significantly different magnitudes of ultimate buildout and population. These different levels of development will influence the region's economy. The economy will also be directly affected by investments and employment activities associated with construction of erosion and runoff control projects.

In the following analysis population levels are calculated from estimates of housing and tourist accomodations that would be permitted under each of the alternatives.

Table 24 depicts the current inventory of developed and undeveloped lots in Nevada by land capability class. The table also shows the potential number of units that could be constructed on the undeveloped lots under current TRPA zoning.

The alternatives are discussed in detail in Section III above. The relevant features of each in terms of new building are described briefly below:

Alternative 1 assumes that, aside from the revised bi-state compact moratorium, the present TRPA General Plan would be the only limit to development in both California and Nevada. The data shown in Table 25 represent the full potential buildout under TRPA zoning including the development of new subdivisions. In California these numbers are for comparison only since both the CTRPA 1980 Regional Plan and the SWRCB Water Quality Plan would govern permitted development on the California side of the Basin, and would produce a result more

Table 24

CHARACTERISTIC OF NEVADA LOTS BY COUNTY[1]

	DEVELOPED	UNDEVELOPED
WASHOE		
Land Capability		
Class 1-b (SEZ)	924	581
Class 1a, 1c, 2	1105	990
Class 3	566	300
Class 4-7	3323	2326
Total Lots	5918	4197
RESIDENTIAL DEVELOPMENT POTENTIAL UNDER TRPA ZONING (UNITS)[2]	10240	
DOUGLAS		
Land Capability		
Class 1-b (SEZ)	429	128
Class 1a, 1c, 2	1127	545
Class 3	205	12
Class 4-7[3]	2251	621
Total Lots	4505	1306
RESIDENTIAL DEVELOPMENT POTENTIAL UNDER TRPA ZONING (UNITS)	5811	

From TRPA, 1980 Physical Inventory of Nevada Development

[1]Carson has no developable land
[2]Assumes one residential unit on each undeveloped lot
[3]Includes lots in TRPA approved subdivisions where land capability challenges have been processed

Table 25

ESTIMATED POTENTIAL HOUSING AND TOURIST UNITS
UNDER DIFFERENT WATER QUALITY PLAN ALTERNATIVES[1]

HOUSING UNITS[2]

California	Alt. 1	Alt. 2a	Alt. 2b	Alt. 3a	Alt. 3b
1980	31,000	31,000	31,000	31,000	31,000
1983	32,200	32,200	32,200	32,000	32.200
Buildout	73,700[3]	-	-	40,250	32,500
Nevada					
1980	10,200	10,200	10,200	10,200	10,200
1983	12,700	12,700[4]	10,500	12,700[4]	10,500
Buildout	26,000	-	-	13,600[4]	10,500

TOURIST UNITS[5]

California					
1980	10,900	10,900	10,900	10,900	10,900
1083[6]	N/A	N/A	N/A	N/A	N/A
Buildout	15,530[3]	-	-	11,950	11,050
Nevada					
1980	3,000	3,000	3,000	3,000	3,000
1983[6]	N/A	N/A	N/A	N/A	N/A
Buildout	10,000	-	-	3,100	3,000

1. Data primarily from SWRCB Final 208 Plan (pg. 222), based upon Dornbusch (1978) as updated to 1980 with building permit data, and TRPA 1980 Physical Inventory of Nevada Development.

2. Includes single and multi-family residences and mobile homes.

3. From CTRPA Regional Plan EIR (pg. VIII-7).

4. Assumes one unit per lot, the number of buildable lots including an estimated 350 lots partially in SEZ's, 50 lots on land capability 3, and 50 new lots as a result of limited exception to subdivision prohibitions. As existing zoning allows multiple units on many lots, the number of units at buildout may be higher.

5. Includes hotels, motels and campgrounds.

6. The bi-state compact limits total commercial square footage approved until May 1983, but it is unclear what fraction of permitted building would be tourist commercial. California's 1980 Regional Plan contains policies that 80% of commercial development should be visitor serving.

consistent with Alternative 3a. It is even doubtful whether the California totals shown for 1983 would be reached. The CTRPA 1980 Regional Plan requires the demonstration of sufficient service system capacity prior to development approval, and the sewage capacity allocated to the north shore public utility districts may not be adequate to provide for the development shown until the system is expanded.

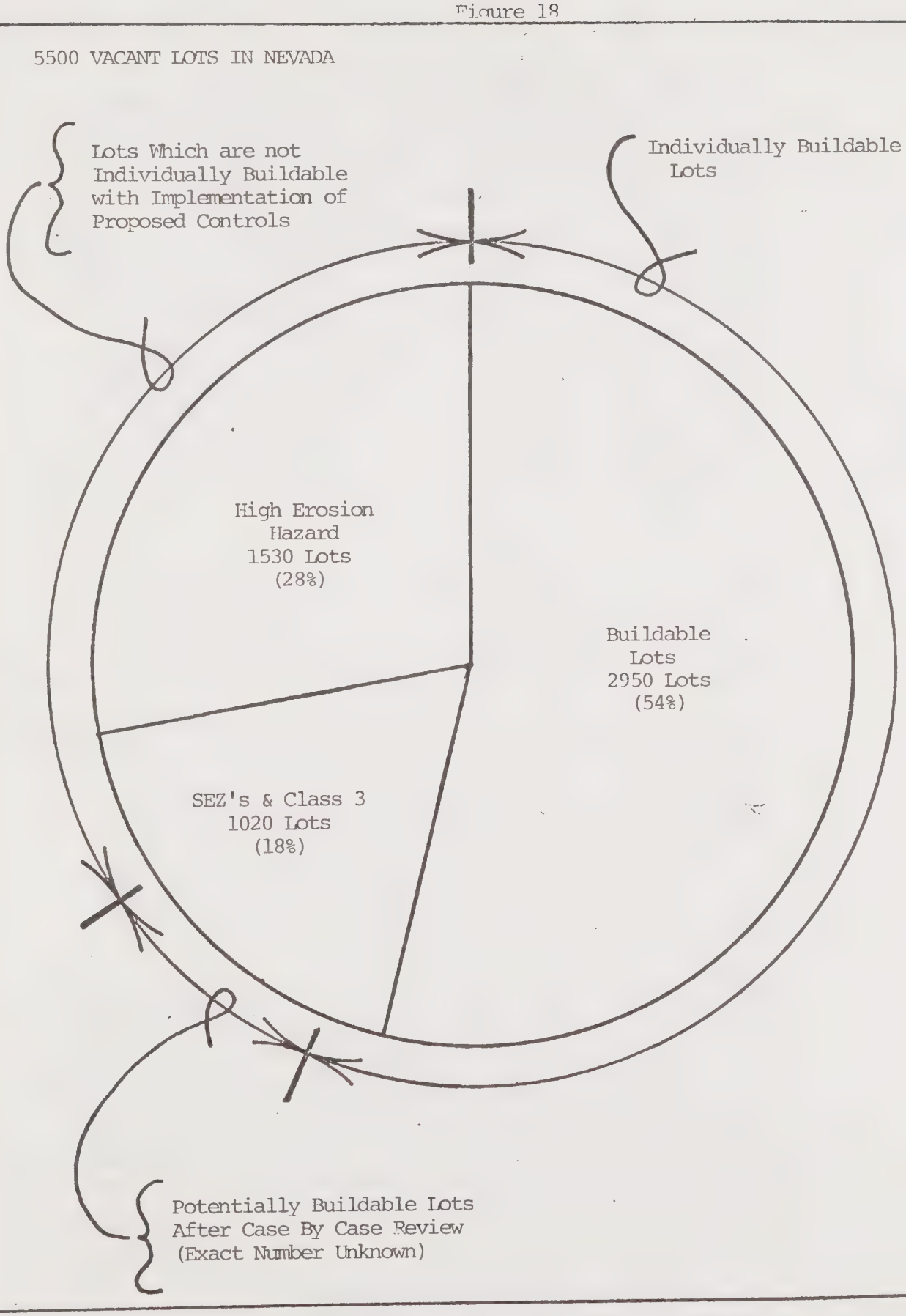
The Proposed Alternative 2a assumes that no development will occur in stream environment zones and class 1a, 1c, and 2 lands and that all other development will conform to land capability coverage limitations calculated on the basis of the lot itself (i.e., excluding coverage associated with public facilities and improvements such as subdivision streets). Development of Class 3 land may be prohibited after a case by case review of individual properties in question. Where there is no feasible alternative, exceptions are provided only for projects necessary to complete regional transportation and air quality plans, to protect public health and safety, or provide for public recreation. The proposed alternatives also prohibits new subdivisions, except that the subdivision of land owned by a general improvement district may be approved if necessary to avoid insolvency of the district. These restrictions would be enforced only until a new TRPA Regional Plan is adopted (scheduled for 1983), so projections are not shown beyond that date.

Alternative 2b applies the same restrictions as the proposed alternative except that land capability coverage limitations are calculated on an area basis, including off-site coverage such as public streets in subdivisions in the calculation of additional allowable coverage.

Alternatives 3a and 3b would impose the corresponding restrictions of 2a or 2b on a permanent basis. As noted previously, alternative 3a is already in force on the California side of the Basin.

Figure 18 shows that, of the existing 5,500 vacant lots in Nevada, which would all be buildable under alternative 1, 2,950 would be buildable under the proposed alternative. Up to 1,000 additional lots in land capability class 3 and stream environment zones would be reviewed by TRPA on a lot by lot basis to determine the availability of a suitable building site in conformance with the other requirements of the proposed alternative. Approximately 625 lots in Douglas County and 2,325 in Washoe County could be built upon under the proposed alternative, in addition to any lots where building is permitted after case-by-case review. The revised bi-state compact would allow 791 residential units in Douglas County (legislation has been introduced which, if approved by both states and Congress, would raise the number to 1,234 units) and 1,724 in Washoe

Figure 18



SINGLE FAMILY UNIT VACANT LOTS IN THE NEVADA PORTION OF THE LAKE TAHOE BASIN AS AFFECTED BY PROPOSED TRPA LAKE TAHOE WATER QUALITY PLAN REVISIONS

up to May 1983. It might appear that the proposed alternative could restrict the total amount of development in Douglas county to levels below those that would result if the compact limits themselves were the only control. However, there are several reasons to suggest this would not be the case. TRPA's lot by lot review of the 1,000 SEZ and land capability 3 lots is likely to reveal enough buildable sites to make up any shortfall (TRPA's permit history shows that approximately half the lots partially within SEZ's have enough land outside the SEZ to allow construction consistent with capability constraints). The proposed alternative also permits a very limited exception allowing a general improvement district threatened with insolvency to subdivide land, provided there is no significant adverse environmental impact. In addition, the numbers in the revised compact are addressed to the number of units built, not the number of lots built upon. Existing zoning ordinances allow more than one residential unit per lot in many instances. Thus, the construction of multiple dwelling unit structures could provide more units than would otherwise be constructed on a one unit per lot basis.

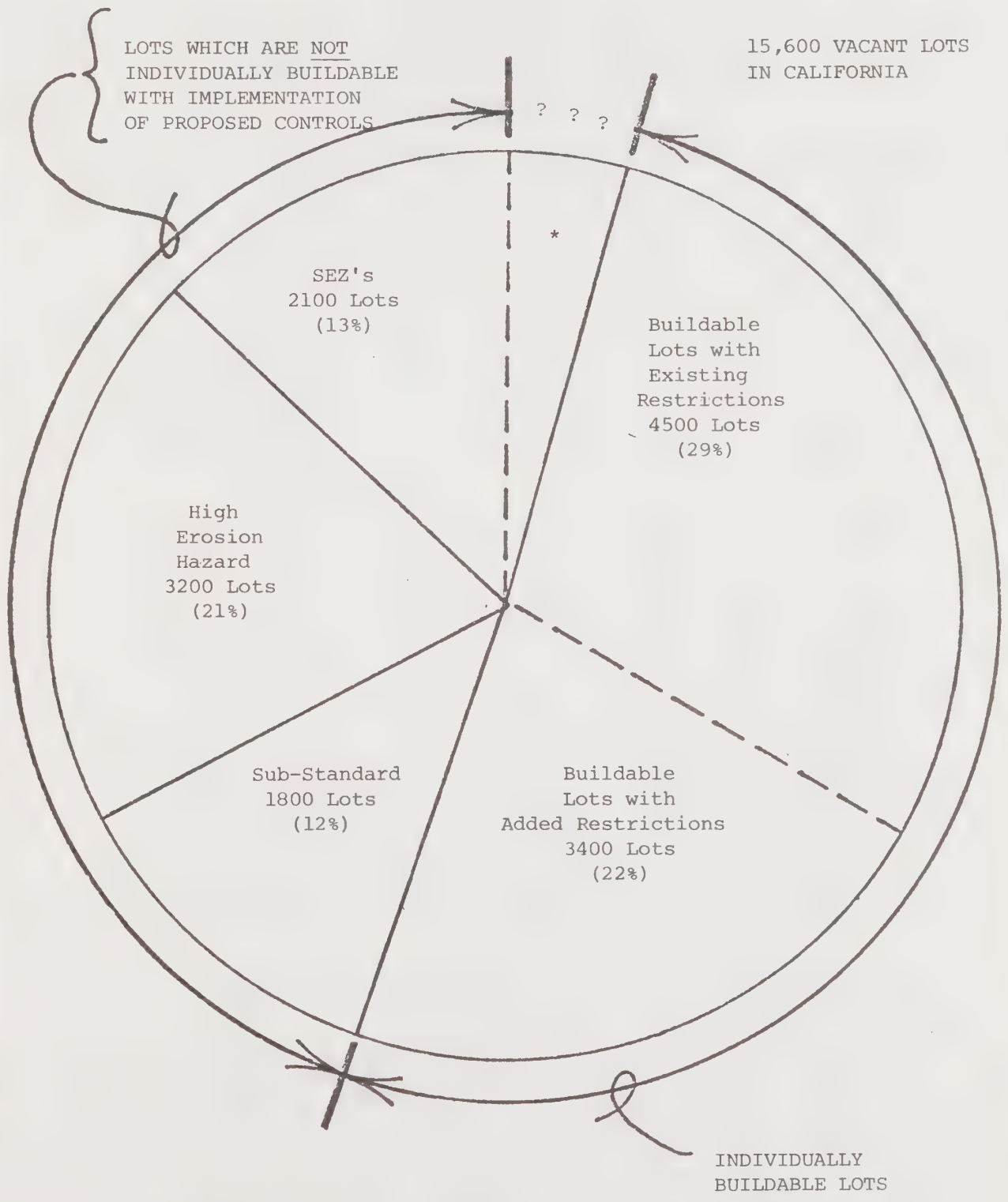
Finally, the recent five year average of Nevada residential permit demand is below that allowed by the compact and this demand could be accommodated under the proposed alternative. For these reasons it can be concluded that the proposed alternative would redirect, rather than limit the overall amount of development that would have occurred under the baseline alternative.

Figure 19 shows how the proposed alternative would affect the existing vacant lots in California. These lots are predominantly residential, and their numbers are sufficiently large that the compact limits and other factors such as sewage treatment capacity would limit development over the next two years, rather than the restrictions of the proposed alternative.

Table 25 summarizes the vacant lot and potential unit information. Table 26 shows the corresponding average summer population for the Basin associated with these unit totals.

As the discussion above indicates, Alternative 3a, which would impose the development restrictions of the proposed alternative on a permanent basis, would significantly reduce the amount of residential development from what would occur in the absence of new controls. Within existing subdivisions, about half as many lots could be built upon under Alternative 3a as could be built upon under Alternative 1. Alternative 3a would also prohibit new subdivisions, which would be allowed under Alternative 1, although other factors such as water supply and sewage treatment capacity may prevent much of the new subdivision development which would otherwise be allowed under Alternative 1.

Figure 19



*Man Modified SEZ's
-600 Lots (4%)

SINGLE FAMILY UNIT VACANT LOTS IN THE CALIFORNIA PORTION OF THE LAKE TAHOE BASIN AS AFFECTED BY THE PROPOSED TRPA LAKE TAHOE WATER QUALITY PLAN REVISIONS

Table 26

ESTIMATED POTENTIAL AVERAGE SUMMER POPULATION
UNDER DIFFERENT WATER QUALITY PLAN ALTERNATIVES[1]

	Alt. 1	Alt. 2a	Alt. 2b	Alt. 3a	Alt. 3b.
PERMANENT RESIDENTIAL[2]					
California					
1980	72,900	71,900	71,900	71,900	71,900
1983	74,700	74,700	74,700	74,700	74,700
Buildout	171,000	-	-	93,400	75,400
Nevada					
1980	23,650	23,650	23,650	23,650	23,650
1983	29,450	29,450[4]	24,350	29,450[4]	24,350
Buildout	60,300	-	-	31,550[4]	24,350
VISITOR RESIDENTAL[5]					
California					
1980	25,300	25,300	25,300	25,300	25,300
1983[6]	N/A	N/A	N/A	N/A	N/A
Buildout	36,000[3]	-	-	27,700	25,650
Nevada					
1980	6,950	6,950	6,950	6,950	6,950
1983[6]	N/A	N/A	N/A	N/A	N/A
Buildout	23,200	-	-	7,200	6,950

1. Data primarily from SWRCB Final 208 Plan (pg. 222), based upon Dornbusch (1978) as updated to 1980 with building permit data, and TRPA 1980 Physical Inventory of Nevada Development.

2. Includes single and multi-family residences and mobile homes.

3. From CTRPA Regional Plan EIR (pg. VIII-7).

4. Assumes one unit per lot, the number of buildable lots including an estimated 350 lots partially in SEZ's, 50 lots on land capability 3, and 50 new lots as a result of limited exception to subdivision prohibitions. As existing zoning allows multiple units on many lots, the number of units at buildout may be higher.

5. Includes hotels, motels and campgrounds.

6. The bi-state compact limits total commercial square footage approved until May 1983, but it is unclear what fraction of permitted building would be tourist commercial. California's 1980 Regional Plan contains policies that 80% of commercial development should be visitor serving.

Data compiled for the SWRCB Water Quality Plan indicate how Alternatives 2b and 3b would affect housing construction. The SWRCB Plan estimates that if development is limited to existing subdivisions, and if strict adherence to land capability is required (with coverage attributable to subdivision roads taken into account in computing permissible coverage) only 1,560 more residential units could be built on the California side and only 300 more could be built in Nevada. The partial moratorium in the revised compact allows 1,237 new residential units on the California side and 2,515 new units on the Nevada side over the next two and one third years. Thus, Alternative 2b, which sets controls pending completion of a revised Regional Plan, would affect the distribution of residential development in California, but might not significantly affect the total amount of development for the period over which controls are in effect. Alternative 3b, which imposes the same controls on a permanent basis, would greatly reduce the amount of development allowable in California. On the Nevada side, even the temporary controls set by Alternative 2b would greatly reduce the total amount of development.

b. Impacts of Development Potential Reduction on Housing and Population Characteristics

While none of the alteratives will reduce development from the levels that presently exist, they will affect the potential for new development. In California, but not Nevada, this reduction of potential development projected for Alternative 3a does not really constitute a "new action", since existing controls of the SWRCB Water Quality Plan and the CTRPA 1980 Regional Plan accomplish virtually the same effect as alternative 3a. A detailed study of the economic and related population and housing impacts was made by the economic consulting firm of Recht, Hausrath and Associates (1980) prior to taking this action. Their report is incorporated by reference. The Social, Economic and Environmental Impacts Section of the SWRCB Plan and the EIR on the CTRPA plan (1980) are also so incorporated.

These reports conclude that reducing the total amount of land available for development would, over the long-term, combine with other factors to contribute to upward pressure on housing prices. The most significant of these other contributing factors is the extent of increases in employment generated by potential casino expansion (including new structures "grandfathered" by the revised compact and internal conversions of general public use areas to gaming), and the growth of hotels, motels, restaurants, and retail establishments serving casino patrons and other visitors. The increased demand for housing produced by employment expansion could lead to increases in occupancy (use of summer homes for year round rental), increases in persons-per-household through "doubling-up", or spillover of housing demand from the South Shore to adjacent areas of

Douglas County's Carson Valley, and, to a lesser extent, Alpine County, from the north shore to Truckee. The amount of spillover demand is likely to be limited, since this demand is made up of people moving to the Tahoe area from other areas. These people may be attracted to the Tahoe Basin as much by the opportunity to live at Lake Tahoe as by the availability of employment, and might be unwilling to commute from adjacent areas.

Because the proposed alternative sets controls only until a revised Regional Plan is adopted, and the revised compact limits the amount of construction permissible during that period, the restrictions set by the proposed alternative will not have a significant impact on housing prices. As can be seen in Table 25, however, making these restrictions permanent would result in a lower total number of units at buildout. Over the long term, this limit on potential supply would result in appreciation of existing and new home prices under alternative 3a at a level five to ten percent higher than the appreciation that would have occurred under alternative 1 (Recht, Hausrath and Associates, 1980, pg. 81).

Low-income housing is already limited within the Tahoe Basin, and this condition is not likely to change under any of the alternatives. The market incentive for production of affordable housing is virtually non-existent in the Basin. Approximately 45% of the existing residential units are second homes, and perhaps an even higher percentage of any new construction would also be for second homes (Dornbusch, 1978). As discussed in detail in the CTRPA 1980 Regional Plan, foregoing or relaxing environmental controls would not lead to production of affordable housing (CTRPA Plan, 1980 a., pg. 33). Each of the alternatives would provide some flexibility to local and regional governments in establishing direct or incentive provisions for the development of affordable housing. In California, the new CTRPA Plan includes such provisions in tandem with controls similar to those of alternative 3a.

To the degree that alternative 3a would lead to somewhat higher home prices than alternative 1 over the long run, the population of the Basin under alternative 3a could be expected to be somewhat more affluent on the average than that which would result under alternative 1.

c. Employment and Economy

The protection of the Basin's environment, in particular the unique clarity and quality of the Lake itself, is vital to the maintenance of the region's resort-based economy over the long-run. However, the impacts of the implementation of

the various alternatives, in the short-run especially, could affect some economic sectors, including owners of restricted properties and residential and commercial building contractors, while benefiting others, such as owners of existing homes and contractors capable of performing erosion control work. The impacts of the proposed alternative would be comparatively limited because it will result in a shift of permitted development rather than an outright reduction.

Recht, Hausrath and Associates (1980) conducted a detailed economic assessment of the effects of adopting a plan comparable to the proposed alternative and alternative 3a in California. Their analysis also addressed Nevada, and their conclusions are generally applicable to the Basin as a whole, which is the concern of this EIS. Their report is incorporated by reference. The major findings of their report are summarized below.

The restrictions on development would have the most significant economic effect, although other requirements such as on-site runoff controls could result in as much as a 20 percent decline in the value of some affected properties. As shown in Figures 18 and 19, restrictions under the proposed alternative could render 7100 lots in California and and less than 2,550 lots in Nevada unusable for residential or commercial development over the period the restrictions would be in effect.

Some factors, such as inflation and high interest rates, would affect land values under all alternatives, and it is difficult to separate out the effects attributable to the alternatives alone. More importantly, current limits on development caused by lack of sewage capacity in California are already strongly impacting undeveloped lot prices. The difference between average prices of lots with and without sewer permits is between $20,000 and $25,000 in most neighborhoods, and up to $37,000 in the most expensive neighborhoods.

The Recht/Hausrath analysis indicates that for the Basin as a whole under alternative 3a the total increase in market value of developed and undeveloped properties could equal or exceed the decline in market value of undevelopable property. The increased value of developable and developed land will reflect not only economic benefits from restrictions on further development, but environmental and a esthetic benefits as well.

Owners of lots which cannot be developed consistent with the restrictions of alternatives 2a, 2b, 3a and 3b will, however, be adversely impacted, seriously so under alternatives 3a and 3b. As discussed in Section VI, programs for the transfer of development rights and land purchase programs such as the Santini-Burton measure will mitigate any severe impacts.

Employment impacts were also analyzed in the Recht, Hausrath study. Total Basin employment would probably not be significantly affected under the proposed alternative since current conditions already approximate that alternative in California, and overall development activity would predominantly be redirected, rather than reduced, in Nevada. Even if these restrictions were permanently adopted, as provided in alternative 3a, total employment would nevertheless be higher than present, although less than the level that would result under Alternative 1.

Table 27 presents a comparison of the relative amount of employment under alternative 3a as compared to the "baseline" alternative 1.

The greatest impact would be on jobs in the construction industry. Under Alternative 3a it is estimated there would be 35% fewer construction jobs over a 20-year buildout period than would have resulted under buildout of existing lots without restrictions. The level of construction activity however, would not be below that at present. Employment estimates for alternative 1 assume a much higher rate of housing construction than is presently the case. It should also be recognized that, under any alternative, buildout of the Basin would occur in the near future and construction jobs would be curtailed to redevelopment and remodeling.

Real estate and finance employment would increase under either alternative 3a or 1, though the increase would be greater under alternative 1. However, higher property values created by development restrictions would result in higher incomes to real estate industry works paid by commission.

Fewer jobs will be created in the Basin in medical, legal, governmental and educational services under alternative 3a than under alternative 1. The demand for workers in these areas is dependent upon the size of the residential population, which would be smaller if development restrictions were made permanent.

In the retail and service industries, a slightly higher employment rate would result under alternative 3a than under the baseline. This would be due to greater visitor spending relative to spending by residents, at higher incomes. The analysis found that while the average summer population would be 15 percent lower under alternative 3a than under the baseline, jobs in the retail and service industries would be only 11 percent lower.

For recreation and the hotel/motel industries, the difference in total employment between the alternatives would be relatively small. Under alternative 3a occupancy rates will be higher and a larger percentage of the Basin population will be visitors.

Table 27

SUMMARY OF EMPOLYMENT IMPACTS OF ALTERNATIVE 3 IN COMPARISON TO ALTERNATIVE 1* WITH NO NEW SUBDIVISION

ECONOMIC SECTOR	IMPACT
RESIDENTIAL REAL ESTATE MARKET:	
Employment in the Construction of Houses or Hotels/Motels	• Less employment due to fewer units built in Basin • More employment building residential units in other parts of the Lake Tahoe area. • More labor per house built in Basin because of "Best Management Practices" requirement and higher value houses. • Less labor per house built in Basin when coverage requirements limit unit sizes. • Unemployment to be affected more by the pace of development than the total number of units permitted.
Real Estate and Finance Employment	• Less employment because of fewer units built, sold and resold. • Higher incomes for those paid by commission due to higher property values
Employment in Construction Supply Firms	• Less employment due to fewer housing units built in the Lake Tahoe area.
Remodeling Employment	• More employment in the short-term as the market upgrades house values to land values. • Less difference in long-term because of fewer total housing units.
Multiplier Effects	• Less employment due to overall less employment in the residential real estate sector.
PERMANENT EMPLOYMENT – NOT REAL ESTATE RELATED:	
Permanent Employment (Not Real Estate Related) Providing Goods and Services Locally	• Depends on visitor dollars spent in the local economy. • Fewer visitor dollars and, therefore, less employment, due to fewer total units, but visitor dollar difference (and, therefore, employment difference) mitigated by: – a higher ratio of visitor to non-visitor occupants of dwelling units; – higher per capita expenditures of visitors; and – higher proportion of day visitors in the Basin.
OTHER CONSTRUCTION-RELATED EMPLOYMENT:	
Employment in the Construction of Retail, Commercial, and Recreational Facilities	• Less employment due to fewer visitor dollars. • Perhaps less employment because of development policies of the Plan.
Employment in the Construction of Erosion Control Projects	• More employment since erosion control projects are not required under No Action.
Multiplier Effects	• Less Employment due to construction of retail, commercial, and recreational facilities. • More employment due to construction of erosion control projects.

(Source: Recht-Haurath & Associates, 1980, pg. 16)

*Impacts would occur in California regardless of TRPA action.

The overall result of less development in the Tahoe Basin is likely to be more stable economy. There will be fewer total jobs under alternative 3a than alternative 1, but there will also be a smaller residential population. The number of jobs per Basin resident will be greater with less development. There will also be less seasonal fluctuation in employment, reducing unemployment rates. Average wages and salaries could be lower, however, as service and trade jobs generally pay less than construction-related jobs.

The impacts of the proposed alternative on employment and the Basin economy, especially impacts on the construction and real estate industries, will be much less pronounced than those of the permanent controls set by Alternative 3a. Because the revised compact limits the amount of development which may occur during the period controls would be in effect, the proposed alternative would amount to a redirection of where development occurs, rather than a reduction in the total amount of development. In fact, the proposed alternative could well increase construction employment, because of the additional jobs created by erosion control work.

5. Public Services and Utilities.

The discussion of the impacts of the alternatives on public services and utilities includes an evaluation of the direct effect of proposed prohibitions on the location of service facilities, the direct costs to local governments of implementation of erosion control projects and other remedial measures, and the indirect effects on service systems of lower levels of potential future urbanization which could result from development restrictions.

Again, it should be recognized that the impacts of the proposed alternative would be limited because it applies for only a limited duration, and during this time overall limits on development would be enforced in any case under the provisions of the bi-state compact. Also, impacts attributed to the proposed alternative and alternative 3a would occur in California regardless of the action taken because comparable requirements already exist. The analysis presented below summarizes more detailed analyses which may be found in the documents incorporated by reference. While these documents present fewer data on the condition of services in Nevada than in California, their analysis of the nature of impacts that could be expected would apply to corollary services in Nevada.

None of the alternatives should restrict the ability to construct essential public services in the Basin. High capability sites could be found where new facilities could be constructed consistent with development restrictions of the various alternatives. Moreover, these

alternatives provide for exceptions to their restrictions for new projects or expansion of existing sites which are necessary for the protection of public health or safety, or are needed to complete elements of the regional transportation and air quality plans.

The direct effects of the proposed erosion control and onsite management programs would beneficially impact some public services as described in the following excerpt from the Assessment of Water Quality and Environmental Impacts of the original TRPA Water Quality Management Plan (Volume III, TRPA, 1977, page VII-5):

a. Ice Control: Provision of surface water management facilities and the utilization of design criteria contained in Volume II, Best Management Practices, will reduce the need for ice control measures, since runoff from snowmelt will be collected and conveyed in stable drainage systems rather than allowed to sheet flow across roadways where it can freeze in thin layers which necessitate ice control for public safety. The associated water quality degradation caused by ice control compounds will be reduced. Improved ice control without the use of ice control compounds represents a long-term beneficial impact upon public services.

b. Local Ponding and Flooding: The existing lack of drainage and infiltration facilities for managing runoff water from impervious surfaces causes many local problems with runoff water ponding in low spots or flooding areas of major impervious surfaces. The provision of adequate storm drainage and upstream infiltration will substantially reduce these problems.

c. Pedestrian Facilities: Many existing roadways have no sidewalks for pedestrian use or curbs and gutters to protect pedestrians from traffic. Design criteria in Volume II, Best Management Practices, provide for the inclusion of sidewalks and curbs and gutters to separate pedestrians and vehicular traffic.

d. Public Expenditures: Reduced ice control efforts and reduction of local ponding and flooding will reduce the expenditure of public funds necessary to supply these services. Some public expenditure will be necessary to supply these services, but the proposed alternative should have a beneficial impact upon roadway maintenance budgets.

As proposed, alternatives 2a, 2b, 3a and 3b would be supported in part by state and federal grants, and work accomplished and paid for by state and federal governments, limiting the local share of direct costs. The degree to which costs of erosion control projects would be offset by savings in road maintenance expenditures may be indicated by the results of a recent study by the SWRCB (White & Franks, 1978). The study found that costs of erosion control at a heavily eroding Basin site would pay for themselves over a ten-year period in reduced road maintenance

costs. The savings would be enough to pay for the entire cost of the project, not just the share local government would have to pay if the project were paid for in part by the state and federal grants.

Indirect effects of the alternatives would arise from changes in the spatial pattern of development and from the overall reduction of population and development levels projected for alternatives 2b, 3a and 3b. These impacts can be assessed relative to two criteria: The level of service provided and the unit cost of service resulting from differences in the potential ratio of demand to revenue under the different alternatives. The different services are discussed individually below and in greater detail in the economic study incorporated by reference (Recht Hausrath, 1980, page 133 et seq.).

e. Schools: The most important service level and fiscal considerations for school districts is the relationship between enrollment and school capacity. Maximum use of school facilities would result in the lowest per-unit costs, but only to the point where design capacity is reached. If new facilities must be built, per unit costs would rise. In the Lake Tahoe Unified School District lowest costs would be achieved under alternative 3a, because new facilities would not be built. Alternative 1 would yield the lowest costs in the Tahoe-Truckee District which could benefit from growth filling its unused capacity.

f. Health Care: Facilities, with some exceptions, already experience demand above their capacity and would require more rapid expansion under alternative 1 than under the other alternatives.

g. Police: Staffing levels of police can be adjusted to match incremental levels of growth so it is likely the majority of impacts on the quality of service and per-unit cost would be similar under all alternatives. Enlarged capital facilities are presently needed by most of the Basin's sheriff and police departments. If these facilities were constructed, per-unit costs would be least under alternative 1 which would allow costs to be spread over a larger population.

h. Fire Protection: The demand for fire protection services would increase as a result of the additional development permitted under all alternatives. Existing fire station facilities in all but two districts would be adequate to accommodate additional development under any alternative. The Tahoe City and the North Tahoe Fire Protection Districts each may require an additional fire station, with a greater likelihood of this need existing under alternative 1. To the extent development occurs in these and districts as infilling or adjacent to already developed areas (as is more likely under the other alternatives) cost efficiences would result. Also since high

erosion hazard lands present high fire risks, restricting their development under the other alternatives would avoid creating the fire hazards to people and property that would arise under alternative 1.

i. Solid Waste: To the degree that alternatives 3a and 3b would reduce buildout population from that allowed under alternative 1, they would also reduce solid waste problems and allow existing landfills to serve their function for a longer period.

j. Water Service: Interstate water compact allocations limiting the amount of water legally available for domestic and municipal use constrain the overall service capacity of the Basin's water supply systems. As discussed in the Water Quality and Quantity section below, and in further detail in the SWRCB Water Quality Plan (p. 257), full development under alternative 1 could exceed available water supplies unless consumption is cut to well below current levels. Alternatives 3a and 3b, however, could be accommodated under water-compact limits. The relationship between the levels of growth associated with the different alternatives and the need for water supply facilities varies with the individual water system or company. Some of the water delivery systems in the Basin are already inadequate for their existing service populations. Others lack capacity to serve major increases in population, either because of insufficient supply facilities (wells or diversion facilities from the Lake) or because of limited water rights. The Incline Village General Improvement District is an example of the latter situation (SWRCB Plan, page 241). The District estimates it will need 4,600 acre-feet of water annually under full buildout of its service area under alternative 1; yet the District has water rights for only 3,115 acre-feet per year (SWRCB, 1980, page 241). 208

For systems requiring lake diversions to produce supplies needed to service growth, alternative 1 could result in lower per-unit costs than alternatives 3a and 3b at buildout depending on the threshold for new facility needs and the amount of capacity provided. If future water supplies are provided primarily by wells the difference of per-unit costs between alternatives may not be significant. Water distribution systems would probably experience lower per-unit costs under Alternative 1 than alternative 3a and 3b either because existing systems could accommodate growth under alternative 1 or because improvements are needed in any case. Under alternative 1 costs could be spread over more units.

Since the proposed alternative would be in effect for only a limited period of time when development would be limited to the bi-state compact its impacts would be similar to those of alternative 1.

k. Wastewater Services: The adequacy of wastewater collection, treatment and export facilities relative to different growth alternatives are discussed in considerable detail in the CTRPA (1980b) Regional Plan EIR (pg. VI-3) and the SWRCB Final Water Quality Plan (pg. 196). North Tahoe Public Utility District and Tahoe City Public Utility District system capacities are inadequate to support the development that could potentially occur under any of the alternatives, as the systems are already virtually at capacity. The Nevada systems could accommodate development permitted under alternatives 2a, 2b, 3a and 3b without expansion, while the California systems would require treatment plant expansion. Under alternative 1 all treatment plants and all export systems serving the Lake Tahoe Basin would have to be expanded. The resulting unit-cost would exceed that of the other alternatives even though these costs would be spread over the greater number of units allowed by this alternative.

l. Energy Utilities: Natural gas, which is brought in by pipeline, is the largest source of energy in the Lake Tahoe Basin. Existing supply lines are adequate, but some additions will be necessary if development continues. Peak demand for electricity, almost all of which is generated outside the Basin, has exceeded the reliable capacity of existing electrical transmission systems. Reliable capacity is determined by the capacity when the most critical component of the system is out of service. The Sierra Pacific Power Company has proposed a master plan consisting of a series of steps by which capacity can be increased gradually to serve various levels of development. Increases in demand for liquified petroleum gases and fuel oils, now used by about 9,000 residential and commercial customers, can be served by increasing the number of trucks used to deliver supplies or by increasing reserve tank capacity.

m. Transportation: Traffic volume will correspond to the level of development allowed under each of the alternatives. Basin residents account for about 60 percent of the automobile trips within the Basin, but because visitor trips are longer on the average--6.3 miles per trip as compared to 4.1 miles per trip for residents--total miles traveled are about the same. Restrictions on the amount of development will limit the number of residents and visitors in the Basin, and thus also limit the amount of traffic.

Increases in traffic will cause congestion on roads where traffic is now near capacity, and extend the period over which traffic is backed-up at areas already at capacity. A Lake Tahoe Basin Highway Capacity Study, prepared by the CTRPA in 1979, indicates the effect of a 17 percent increase in traffic--less than the increase which may be expected under alternative 3a. On peak days, traffic would exceed highway capacity for

over ten hours at every critical location on the California side of the Basin. At the south shore State line, traffic would be at capacity for 18 consecutive hours. At the north shore, where peak traffic is still slightly below capacity, capacity volumes would be maintained for 13 straight hours. The much larger increase in traffic to be expected under alternative 1 would far exceed that which Basin highways conceivably could handle.

Expanded public transit could limit the increases in traffic, but the extent to which public transit can cut automobile use in the Basin remains to be seen. It is unlikely that public transit could handle even the moderate growth projected under the alternative 3a without some increase in traffic congestion.

Construction of new roads to handle the increased traffic projected for the Lake Tahoe Basin would cause serious water quality problems. Road construction adds large impervious surfaces, increasing surface runoff and erosion. Road cuts also add to erosion and runoff problems. The quality of runoff water from heavily used roads and highways is seriously degraded. The most serious water quality problems threatened by new highway construction in the Lake Tahoe Basin stem from encroachment of stream environment zones and construction in high erosion hazard lands.

The exceptions to the proposed alternative's prohibitions against encroachment of stream environment zones and high erosion hazard lands and land capability controls for projects "necessary for completion of (the) regional transportation... element" would not effectively allow major new highway construction. The revised bi-state compact Article VI.(c.)(6.)(C.) specifically provides that "no new highway may be built or existing highway widened to accommodate additional continuous lanes for automobiles, until the regional transportation plan is revised and adopted" as part of the revised Regional Plan. During the period the proposed alternative would remain in effect, the revised bi-state compact precludes new highway construction as a means of reducing traffic problems.

Alternative 3a and 3b could conceivably allow highway expansion through such exceptions if a new highway or highway expansion were adopted as part of the revised Regional Plan.

n. General Conclusions About Fiscal Impacts of Plan Alternatives: It would not be possible to optimize the cost/revenue relationship for each public service with any of the alternatives. The effects of growth on the cost and revenue characteristics differ among the agencies that provide public services in the Basin. Alternatives 3a or 3b, for example, might result in a "better" cost/revenue situation for one service and a "worse" cost/revenue situation for another, relative to "baseline" alternative 1.

For public services as a whole, alternative 3a may provide a better cost/revenue relationship than alternative 1, since it would probably obviate some capital expenditures while generating higher per-unit revenues. It is not certain, however, that a significant difference would exist between the alternatives. For the period for which the proposed alternative would be in effect, there will be little difference among the various alternatives in terms of impacts on public services as a whole, as the total amount of development permissible during that period is limited by the revised bi-state compact.

Capital expenditures (for fire stations, schools, and the lake) that might be required with alternative 1 are likely to be avoided with the lower amount of growth permitted by alternatives 3a and 3b. Yet, operating expenditures for many services would probably be lower per unit of service output with baseline alternative 1 than with the other alternatives, since fixed costs could be spread over more units.

Agencies that provide water and sewer services would probably be most affected if permanent controls are adopted. The agencies would be denied many cost efficiencies with less growth, resulting in higher per-unit costs. They depend primarily on service fees rather than on property taxes or other revenue sources that would be higher per unit with development controls than without them. Consequently, with less growth it is likely that the service fee per unit would need to be higher than if more growth was permitted.

o. Utility Assessments: There are over 100 assessment districts in the Basin. Per-parcel assessments vary among the districts, and among the parcels within nearly every district.

The outstanding indebtedness on assessment bonds average around $1000 per parcel for all parcels, developed and undeveloped. These assessments could impose an undue burden on lot owners who will not be able to develop their lots because of development restrictions.

A recent appellate court case held that property owners are still required to pay off outstanding assessments after development restrictions are enforced, but the utility districts are concerned about their ability to collect. The outstanding assessments must be collected to pay off bonded indebtedness. There are over $5 million in outstanding assessments on the roughly 11,000 vacant lots in the South Tahoe Public Utility District alone.

6. Water Quality and Quantity

The central purpose of the alternatives plans considered by this EIS is to protect water quality of the Lake Tahoe Basin. The TRPA (1977) assessment and the SWRCB (208 Plan (1980) summarize the benefits to water quality which will result from reductions in nutrient loadings from erosion and surface runoff, and maintenance and enhancement of the natural treatment capacity of stream environment zones. The proposed alternative will provide much greater protection for water quality than existing TRPA plans and ordinances, but less protection than very strict adherence to the land capability system (i.e. including coverage by roads in new and existing subdivisions in the determination of allowable coverage for buildings). The SWRCB plan adopted the minimum controls needed for prevention of degradation of Lake Tahoe's water quality, but pointed out that strict application of the land capability system (as above), or a total prohibition on new development, would be necessary for actual improvement of water quality. The development controls in the proposed TRPA amendments will be applied on a short-term basis, giving less assurance of water quality protection than would permanent controls.

The proposed alternative's implementation of remedial erosion and runoff control projects will also have a more positive impact on water quality than the recommendations in the existing TRPA plan, which does not include commitments for implementation. The more stringent alternative, implementation of controls plus a TRPA regulatory program to ensure compliance, would provide still more protection temporary soil instability created by construction projects may result in short-term impacts on water quality if not properly mitigated. Drainage patterns will be changed somewhat by runoff control measures, but the increased infiltration of runoff into the soil should restore more nearly natural groundwater/runoff conditions. There should be no appreciable change in the quantity of water available for beneficial uses.

In addition to preventing further degradation of Lake Tahoe, implementation of the proposed alternative will maintain and possibly initiate improvement of tributary stream quality, in terms of reduced attached algal growth, and better conditions for fish spawning.

Benefits to water quality as a result of the proposed alternative will be more specifically the result of the following actions:

- Land Development Restrictions. Until the revised TRPA Regional Plan is adopted development which is allowed to occur will be directed towards high capability lands within land capability coverage constraints. This will have the effect of preventing substantial increases in sediment and nutrient loadings to Lake Tahoe and its tributary waters which would occur if development were to proceed without the controls imposed by the proposed alternative.

- Offset Policy. No development will be allowed unless it is offset by measures, either onsite or offsite, which would result in reductions in sediment and nutrient loads equivalent to any increase associated with the development. This will have the effect of not allowing any further increases in sediment and nutrient loading to Lake Tahoe above present conditions. This action, by itself, will not result in net water quality improvement in Lake Tahoe. This will simply hold the rate of deterioration to current levels.

- Phase I Remedial Control Implementation. This is the first 5-year phase of a 4-phase, 20-year program. Phase I is directed at the implementation of necessary revegetation and stabilization of oversteepened slopes at an estimated basinwide cost of $25 million (1979 dollars). Implementation of one-half of Phase I over the next 2-1/2 years will result in a net reduction in the sediment and nutrients to the Lake Tahoe Basin. It is the first step towards overall reduction in sediment and nutrient loadings necessary to maintain Lake Tahoe Water Quality.

- Management of Onsite Runoff. This will permit the immediate regulation and enforcement of controls necessary to reduce sediment and nutrient loadings from individual onsite problem areas. Rather than delay implementation of onsite controls as development or redevelopment occurs, -- an indefinite delay in some cases -- this action will permit the prompt reduction of sediment and nutrient loadings from existing sources.

- Forest Practices. This calls for the specific implementation of best management practices (BMP's) for activities on forest lands.

The proposed alternative calls for the implementation of land development restrictions only until a revised TRPA regional plan is adopted pursuant to the requirements of the revised bi-state compact. The other significant water quality impacting control actions will be imposed on a permanent basis.

a. Land Development Restrictions.

The land development restrictions which will have greatest impact upon water quality include:

- Prohibition on stream environment zones (SEZ) encroachment and further study of plans for SEZ management.

- Prohibition and development controls on high erosion hazard and high runoff hazard lands.

- Controls imposing land capability system on individual parcels.

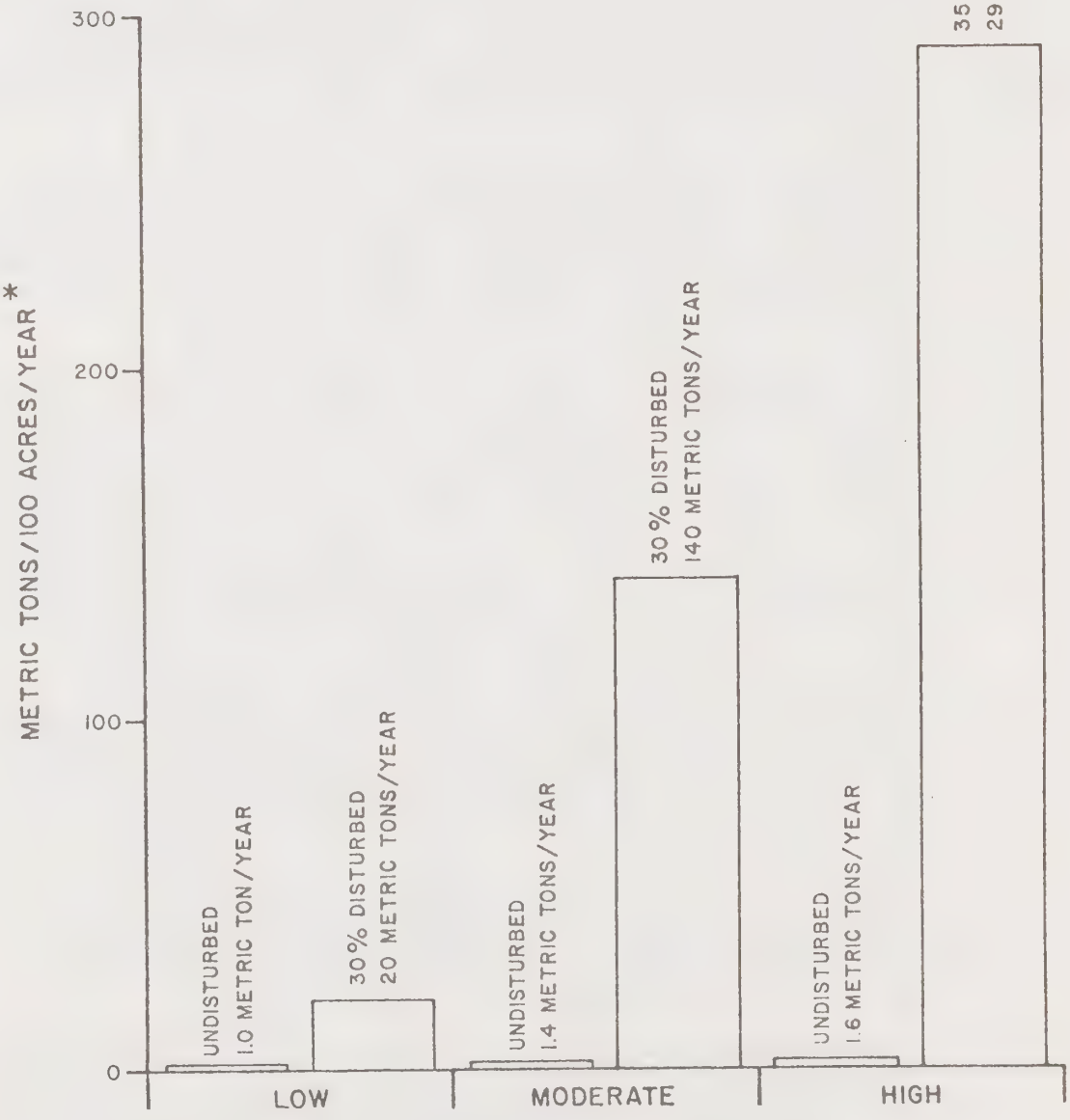
The prohibition on subdivision development is not anticipated to have a major impact upon water quality. Further subdivision development within the Lake Tahoe Basin is prohibited until May 1, 1983 as part of the revised bi-state compact. The prohibitions on subdivisions contained in the proposed alternative would have a substantial beneficial impact on water quality only if a Regional Plan is not adopted by TRPA by May 1, 1983. Construction of new subdivision development can have a profound impact upon water quality. Figure 20 depicts the relative impact of subdivision development on low, moderate, and high erosion hazard lands as measured by resultant sediment production. Subdivision development on low erosion hazard lands would still result in as much as a 20-fold increase in sediment production levels.

Stream environment zones provide a natural, economical system for nutrient and sediment removal. Disturbing these areas reduces their natural cleansing capabilities. As a watershed is developed, meadows are filled and structures are constructed in the stream zone. The stream becomes channelized and the natural treatment of the stream zone is destroyed.

The level of natural treatment effectiveness of various stream environment zones is not understood. The proposed alternative calls for further study of SEZ effectiveness in protection of water quality. Although no estimate of lost natural water treatment capacity due to development is possible, Figure 21 shows the relative level of impact of existing development on urbanized SEZ lands. Approximately 4,400 acres of SEZ have been affected by present urbanization. The level of disturbance ranges from moderate to complete. An estimated 400 acres of SEZ lands have totally lost their treatment capacity due to development. In total, about 50% of existing urbanized SEZ lands have been disturbed by existing development. Without permanent controls as described in alternatives 3a and 3b an estimated additional 17% would be disturbed leaving only 33% of existing urbanized SEZ lands intact. The proposed alternative is to limit SEZ development for approximately 2-1/2 years. Assuming SEZ development would otherwise proceed proportionate to the availability of SEZ lots as compared to total lots, then prevention of further SEZ development during this period would preserve approximately 6% of the remaining undisturbed SEZ lands in urbanized areas.

The proposed alternative would allow development to proceed on SEZ lands which have been substantially man-modified such that no natural treatment capacity remains. If such development is tied to restoration or enhancement of SEZ treatment capacity overall impacts of the proposed alternative will be negligible and may result in net water quality improvement.

Source: SWRCB, 1980



* Sediment yield estimates based on relation among land capability, percent disturbance, and sediment generation set forth in Appendix B. of Calif. SWRCB Water Quality Plan.

** Slightly higher percent disturbance due to steep terrain on most high erosion hazard lands

Comparison of Natural vs. Disturbed Suspended Sediment Production
for a "Typical" 100-acre Subdivision Development
with 400 Single Family Homes resulting in about 30% Disturbance
on Low, Moderate, and High Erosion Hazard Lands in the Lake Tahoe Basin

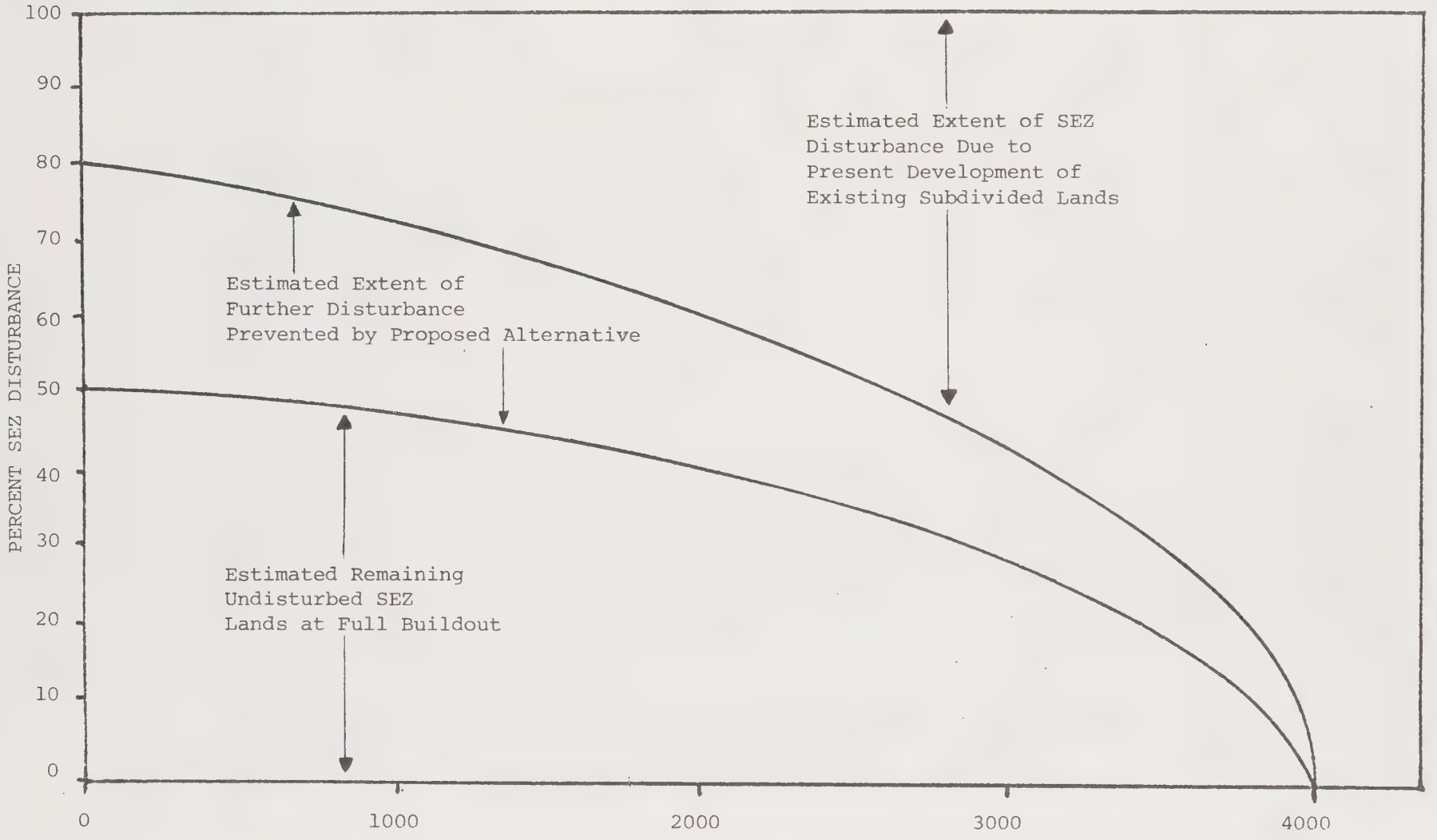


Figure 21: Impact of Development on SEZ Lands in Existing Urbanized Development

Figure 21

In addition to preserving the natural treatment capacity of SEZs, the prohibition against SEZ encroachment will reduce erosion problems. Indeed, many of those SEZs which are less effective in removing sediment and nutrients -- such as those with narrow stream channels or steep gradients -- have a high erosion potential.

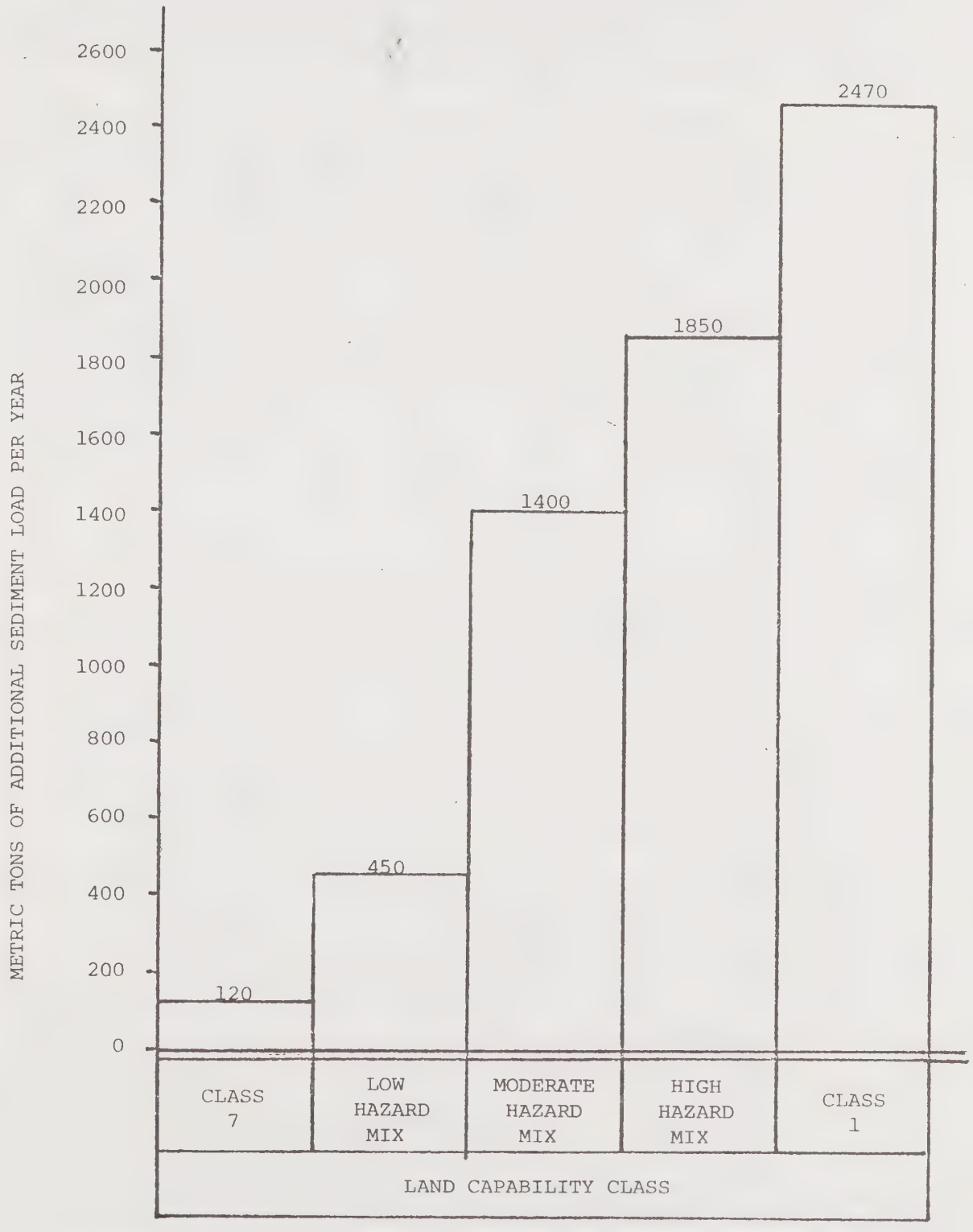
In preventing further SEZ disturbance until adoption of a revised TRPA general plan, the proposed alternative will preserve management options and will not irreversibly commit nonrenewable resources of the Lake Tahoe Basin.

The prohibition of further development on certain low capability lands and the imposition of land capability class coverage constraints will prevent substantial increases in sediment and nutrient loading to surface waters of the Lake Tahoe Basin. Figure 22 shows the relative impact of the roughly 3700 residential units (maxium number allowed under revised bi-state compact) which may ultimately be constructed in the Lake Tahoe Basin over the next 2-1/3 years. If residential development allowed by the compact had been allowed to proceed according to historical patterns, an estimated additional 1400 metric tons per year of suspended sediment (moderate hazard mix) would be generated. The proposed alternative calls for development to occur only on low hazard mix lands. As a result, the proposed alternative would result in an increased loading of only an estimated 450 metric tons per year due strictly to new development. As discussed below, the proposed alternative also calls for implementation of an offset policy which will require reduction of an equal amount of suspended sediment loading from existing sources. Implementation of the proposed alternative will result in only one-third of the added suspended sediment loading which would have occurred without these controls. These estimates on changes in sediment yield rates are based upon data contained in the SWRCB's Lake Tahoe Basin Water Quality Plan (SWRCB, 1980). These values should not be taken as absolutes, but should be viewed as a relative indication of the impacts of proposed actions.

It has been suggested that, rather than imposing interim controls on development in Class 1, 2 and 3 areas, the TRPA undertake a case-by-case review of building permit applications in these low land capability areas. Such a system was utilized by CTRPA in the review of building permits in 1980.

The case-by-case review process developed by CTRPA consisted of a site inspection and review of lots receiving allocations within low land capability districts and stream environment zones. This lot review program was undertaken by CTRPA in

Figure 22



IMPACT OF RESIDENTIAL DEVELOPMENT ALLOWED
THROUGH APRIL 1983 BY COMPACT AS A
FUNCTION OF LAND CAPABILITY SITING
-3700 TOTAL RESIDENTIAL UNITS -

fairness to lot owners who had already received sewer permits pursuant to local government random selection allocation systems. CTRPA realized that the environment would suffer and that the cumulative effect of development on these sensitive lands would not be considered.

A case-by-case review cannot take into consideration the cumulative effects of developing sensitive land in that applications are viewed individually. The interrelationship of the parcel to the surrounding land or geomorphic unit is not assessed when the scope of review is narrowed to an individual parcel. The allowable coverage limits set by the land capability system are based in part on the threat of erosion downslope from areas where impervious surfaces increase surface runoff. Case-by-case review does not take into account these off-site impacts. Viewed on an individual basis, a project may not be seen as causing a significant adverse impact, but when viewed with hundreds of similiar proposals, the outlook may be different. Removal of vegetation and creation of impervious surface within these sensitive areas, as outlined in other sections of this EIS, cause significant increases in sedimentation and degradation of water quality.

Case-by-case review assumes that the impacts of vegetation removal, land disturbance and creation of impervious surfaces can be minimized or mitigated through proper construction techniques and engineered solutions (i.e., infiltration trenches, drainage improvements,erosion control devices, etc.) the SWRCB's project "Demonstration of Erosion and Sediment Control Technology -- Lake Tahoe Region of California" (White & Franks, 1978), these practices can aid, but not significantly reduce, impacts of runoff and sedimentation. As further documented by that study, adherence to the land capability system is the most important mechanism for controlling impacts of runoff and sedimentation.

Reliance upon a case-by-case approach has serious shortcomings in that there is no practical method to ensure long-term maintenance or operation of erosion and drainage control devises or that they are even properly installed in the first place. Typically, the environmental damage has occurred prior to the discovery of the problem. The Land Capability Report and other studies indicate the importance of maintaining healthly vegetation. Once areas are disturbed and vegetation is removed, particularly in Class 1 and 2 areas, nutrients are released and stabilization and revegetation becomes extremely difficult. The CTRPA experience with the case-by-case review, indicates that few proposals conform to land capability standards. The importance of compliance with these standards, particularly in environmentally sensitive areas is discussed in Section II.

The case-by-case review assumes that mitigation will be proposed to offset the potential adverse impacts. Quantification of the mitigation is extremely difficult, if not impossible. Fairness problems also arise, as there is no guarantee of evenhanded regulation when mitigation is bargained for on a case-by-case basis with no objective standard to determine when mitigation is adequate.

While CTRPA released a majority of permits under the case-by-case review process, based upon hardships and equity considerations (local government did not initially allow the transfer of sewer permits), few lots were found to be improperly classified under the land capability system.

Given the shortcomings of case-by-case review, including the administrative problems and the existence of viable alternatives, case-by-case review is not recommended except for class 3 lands where proposed development will conform to land capability coverage limits.

Implementation of land development restrictions will not result in any adverse impact on water availability. Permanent implementation of these controls would keep future levels of development within legal limitations on water use. Full development according to existing TRPA plans and ordinances would very likely result in a level of water use in excess of legally available supplies. As a result, the proposed alternative will keep future water use and development options open and will not deplete available water supplies.

b. Offset Policy

The offset policy as contained in the proposed alternative is an effective mitigation measure to counter the impacts of development which is allowed to proceed. The objective is to hold sediment and nutrient loadings at present levels. Assuming construction of 3700 residential units through April 1983, the cost of implementing the offset policy as a function of where development is allowed to occur is listed in Table 28. Also included as part of Table 28 is an estimate of the total cost of a one-to-one offset policy over the long term. To the extent that water is required for irrigation of offset facilities, such as erosion control projects, the proposed action may increase the level of overall water use slightly. This impact, however, is not expected to be significant.

c. Implementation of Remedial Controls.

Erosion and urban runoff control projects are large-scale remedial measures to control runoff and erosion from past development, especially street and highway construction. These projects involve source controls for erosion and surface runoff problems on public lands and for problems on private lands caused by activities which have been discontinued.

Table 28

OFFSET REQUIREMENTS UNDER DIFFERING CONDITIONS OF DEVELOPMENT

	Estimated Sediment Offset (metric tons/year)	Estimated Total Cost $
A. SHORT TERM IMPACTS 3700 UNITS THROUGH APRIL 1983		
1. Low Hazard Development (proposed alternative)	450	$0.8 million
2. Moderate Hazard Development	1400	$2.5 million
3. High Hazard Devlopment	1850	$3.3 million
B. LONG TERM IMPACTS		
1. Permanent Controls (alternative 3a)	1800	$3.2 million
2. Existing TRPA Plan (alternative 1)	23,700	$65.0 million

Completion of these projects is essential if the load of sediment and nutrients causing deterioration of the Lake is to be reduced. Completion of the projects will eliminate almost half of the sediment generation attributable to human activities, a far greater reduction than can be achieved by control measures on other sources. The cost of completing the erosion and urban runoff control projects will be approximately $95 million in 1979 dollars, requiring development of a phased program to complete these projects.

Figure 23 demonstrates the cost and effectiveness of the control systems. The expected reduction in sediment yield is 28,700 metric tons. The priority groups are ranked as follows:

(1) Revegetation of areas stripped of vegetation on all erosion hazard lands.

(2) Stabilization and revegetation of oversteepened and unvegetated slopes on low erosion hazard lands.

(3) Stabilization and revegetation of oversteepened and unvegetated slopes on moderate erosion hazard lands.

(4) Stabilization and revegetation of oversteepened and unvegetated slopes on high erosion hazard lands.

(5) Eroding dirt roads on high erosion hazard lands.

(6) Roadside drainage on high erosion hazard lands.

(7) Storm drainage for complete systems all or part of which are on high erosion hazard lands.

(8) Protective surface cover on eroding dirt roads on moderate erosion hazard lands.

(9) Roadside drainage on moderate erosion hazard lands.

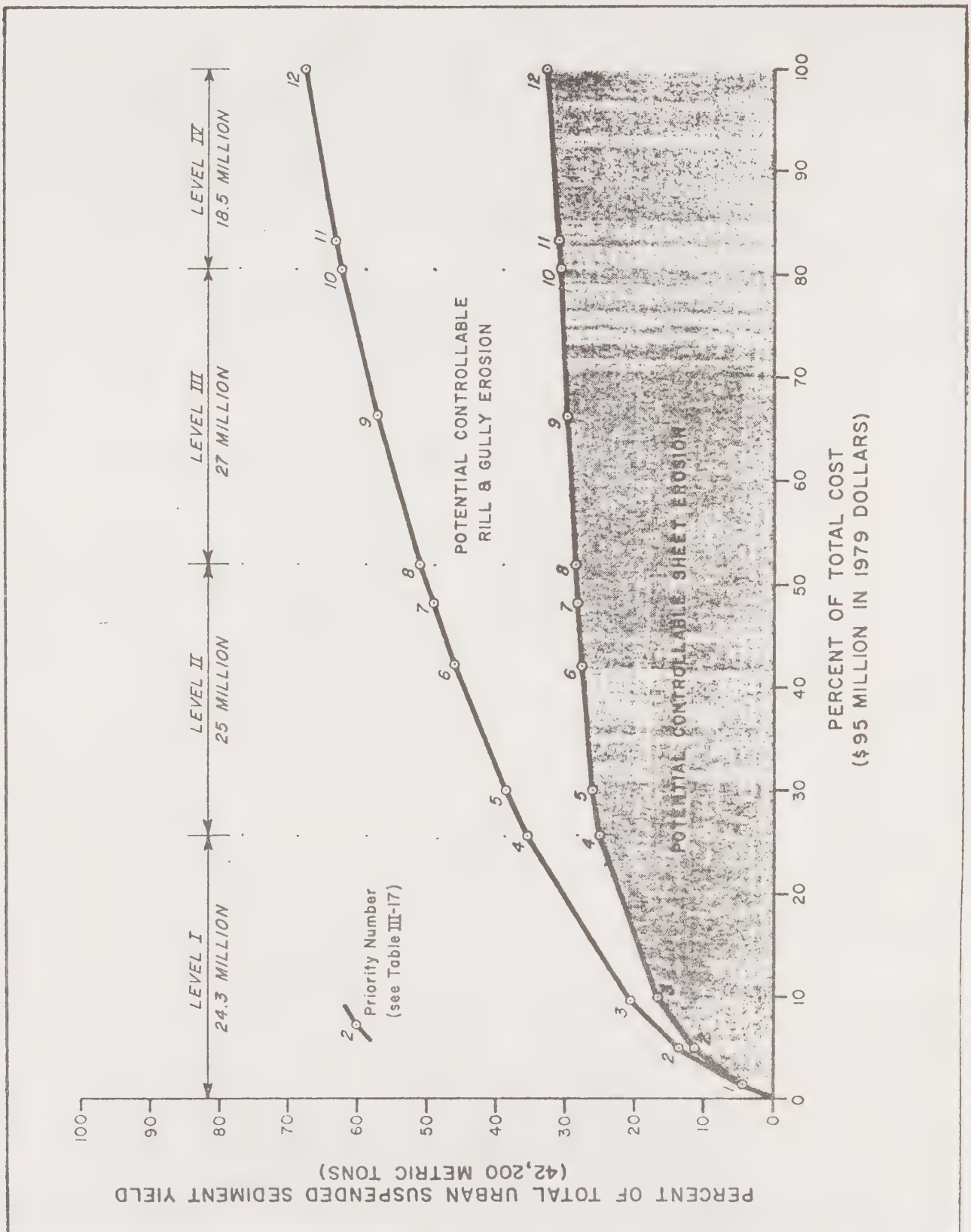
(10) Roadside drainage on low erosion hazard lands.

(11) Protective surface cover on eroding dirt roads on low erosion hazard lands.

(12) Storm drainage on moderate and low erosion hazard lands.

Figure 23 compares sediment reduction with project costs. Expenditure of 30 percent of the total basinwide cost results in an estimated reduction of about 56 percent sediment yield which can be controlled by the projects. At a 50 percent expenditure level, 74 percent of the total controllable sediment production can be eliminated.

Figure 23



COST EFFECTIVENESS CURVE FOR EROSION CONTROL
PROJECT IN THE LAKE TAHOE BASIN
Source: SWRCB, 1980

Clearly, the earlier phased projects are more cost-effective than those which are programmed for later implementation. Phase I projects (Level I, priorities 1-4) are basically erosion and slope stabilization projects. More is known about the cost and effectiveness of these projects than the ones which are phased for later implementation. More work should be conducted during the implementation of Phase I projects to evaluate the cost and effectiveness of later phases. The cost of implementing the first 2-1/3 years of Phase I remedial controls will be $11.0 million and result in an estimated suspend sediment yield reduction of 6160 metric tons/year.

Full implementation of remedial control measures may ultimately require significant amounts of water for adequate revegetation and stabilization of unvegetated and disturbed terrain. Without controls on development remedial control projects may be in competition with future development for remaining available water supplies. This should not arise as a significant issue over the next 2-1/3 years.

d. Management of Onsite Runoff.

The control measures needed to prevent runoff from areas with onsite surface runoff control problems from reaching surface waters without adequate treatment must be adapted to each individual site. This discussion sets forth the general kinds of controls required. Further detail is provided by the Handbook of Best Management Practices (TRPA, 1977).

Street and parking lot sweeping are the most important control measures for on-site problems. Street and parking lot sweeping probably accounts for about 80 percent of the total suspended sediment reduction of approximately 4,000 metric tons which can be achieved through application of on-site controls. The total cost of implementing on-site controls is estimated at $30 million, with most of the cost attributable to street sweeping and to installation of drainage facilities. The reduction in dissolved nutrients will be minor, but the reduction in particulate bound nutrients from street sweeping will be comparable to the reduction in suspended sediments. Street and parking lot sweeping also helps prevent clogging of infiltration facilities.

e. Forest Practices

The specific BMP's proposed for implementation are expected to result in a significant, yet unknown, reduction in sediment and nutrient loadings.

The overall water quality impacts of long-term implementation of all proposed control actions, as represented by estimated levels of suspended sediment loadings, is depicted in Figure 24. Figure 25 compares the overall water quality impacts of all alternative plans considered in this EIS. Only through implementation of long-term controls will adequate improvement in water quality protection be achieved. Simply to preserve the existing water quality of Lake Tahoe sediment and nutrient loadings must be reduced to levels much closer to natural loadings than to current loading rates.

7. Air Quality

To the extent that limitations on the amount of development reduce traffic volumes, alternatives 2b, 3a and 3b will help prevent air pollution problems. All of the alternatives except alternative 1 will also concentrate development on high capability lands in presently urbanized areas. This concentration of development could conceivably increase traffic congestion, and thus increases carbon monoxide emissions, in specific areas. At the same time, however, concentration of development will help facilitate use of public transportation, thereby reducing automobile emissions. Construction of erosion and drainage control projects will create temporary air pollution in the form of dust and vehicle emissions.

The SWRCB plan (1980), on pages 266-269, analyzes the consistency of its proposed development controls with the state's Nonattainment Air Quality Plan. All of proposed alternatives except a alternative 1, are consistent with adopted nonattainment plans.

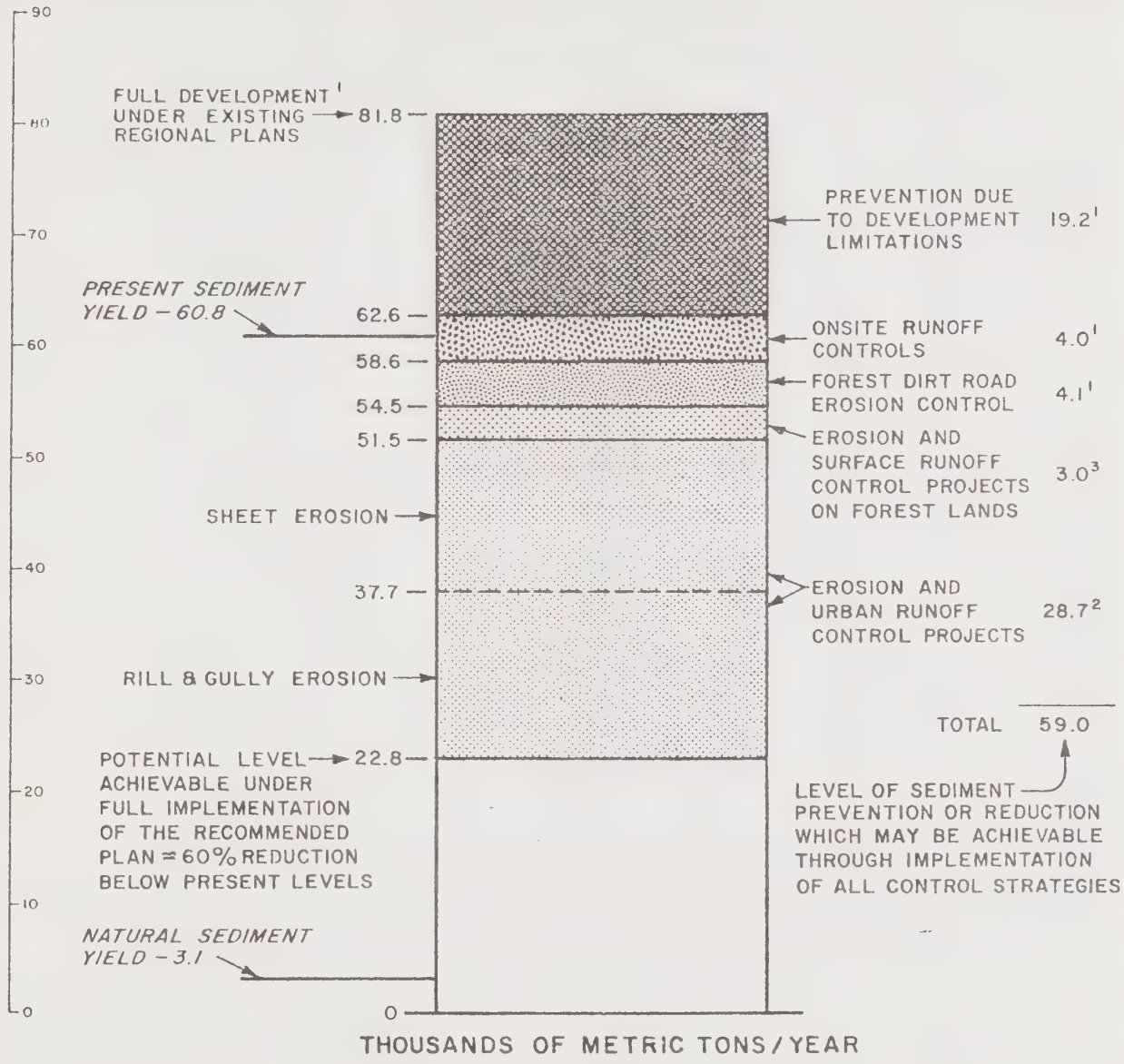
8. Biota

The proposed restrictions on development and remedial control measures will be beneficial to the plants and animals of stream environment zones, high erosion hazard lands, and aquatic ecosystems, by preventing direct disturbance of these organisms and indirect disturbance or destruction of their habitats. The revegetation of slopes denuded of vegetation is high on the priority list for remedial controls.

The protection and improvement of water quality will probably result in changes in the numbers and diversity of aquatic organisms, but the trend will be toward more natural conditions.

There will be local negative impacts on the biota of the areas to which development is redirected. Construction of homes, commercial buildings, and remedial control projects will destroy native vegetation and displace wildlife. Non-native plant species may be introduced by revegetation and landscaping, and domestic animal populations will increase in residential areas. However, the areas to which development will be redirected have already been disturbed to some extent.

Figure 24



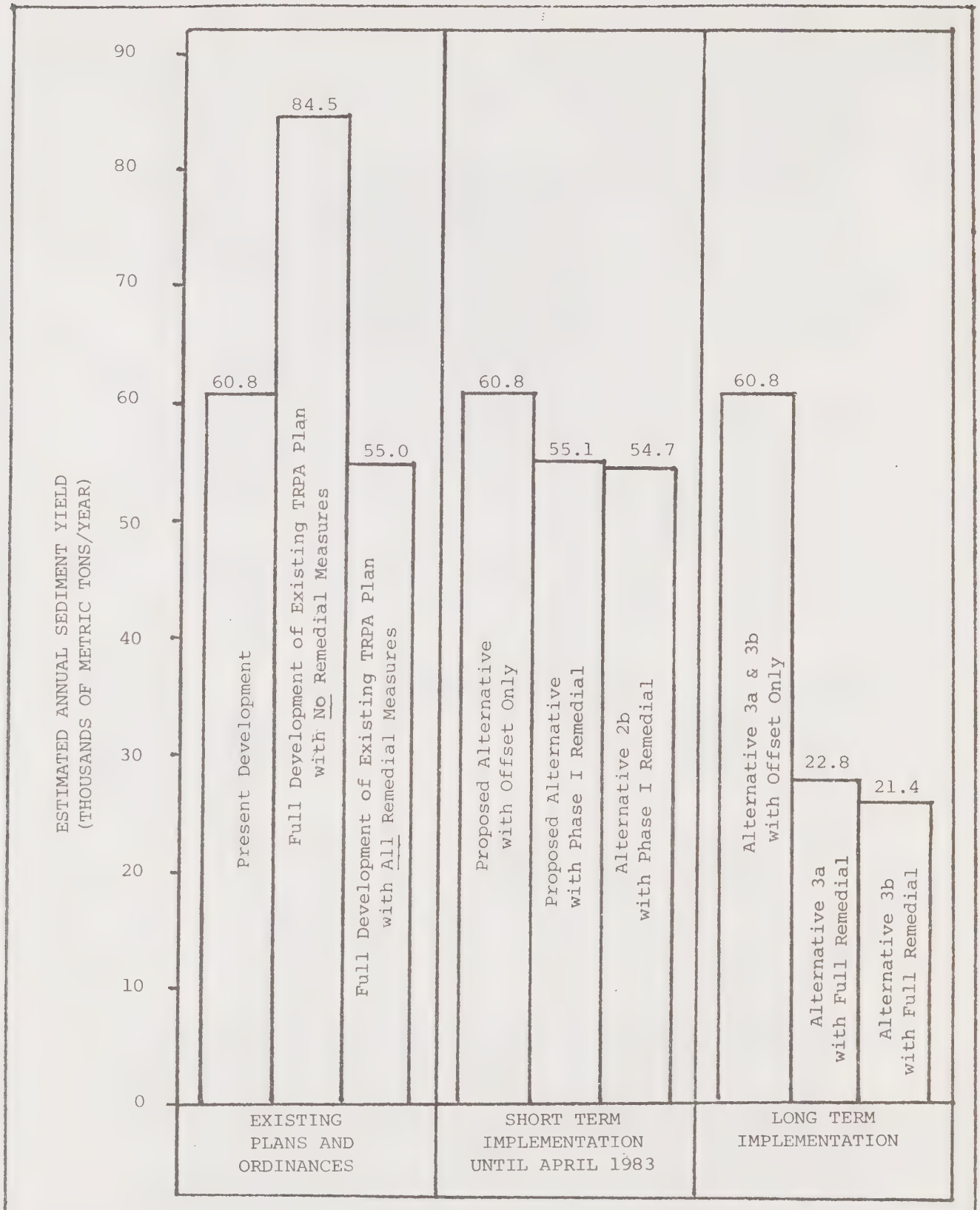
Data is based on information contained in the California SWRCB Lake Tahoe Water Quality Plan:

1. Sediment yield estimates based on relation among land capability, percent disturbance, and sediment generation set forth in Appendix B. Estimate for full development assumes California Tahoe Regional Planning Agency General Plan governs development in California, Tahoe Regional Planning Agency General Plan governs development in Nevada. Estimate for on-site runoff controls is based on measures of runoff quality from areas of 100 percent impervious surface, discussed in Appendix B.
2. Sediment yield estimate based on Universal Soil Loss Equation, set forth in Appendix C, plus estimate of rill and gully erosion.
3. Sediment yield estimate based on comparison of observed levels with levels expected under natural conditions for specific sites on National Forest lands having erosion problems caused by previous human activities.

Source: SWRCB, 1980

Estimated Sediment Yield Levels Achievable through Implementation of the Proposed Plan

Figure 25



COMPARISON OF OVERALL WATER QUALITY
IMPACTS OF ALTERNATIVE PLANS

9. Significant Environmentally Sensitive Areas

The proposed alternative will provide more protection than the existing TRPA plan for the fragile plant and animal communities of stream environment zones and high erosion hazard lands. It will preserve, and in some cases, enhance the capacity of stream environment zones to treat surface runoff and protect surface water quality. The preservation of open space, particularly in stream environment zones will lessen the possibility of disturbance of undiscovered archaeological and historical sites. The proposed alternative will not provide additional protection for rare and endangered species, particularly plant species, which may occur in areas where development is permitted.

10. Noise

Construction of the proposed erosion and drainage control projects will result in temporary increases in noise during working hours. Increases in vehicle traffic in congested areas, resulting from the redistribution of development, will increase urban noise levels.

11. Light and Glare

The redistribution of development resulting from the proposed alternative will reduce light and glare in outlying areas, but may increase it in already urbanized areas.

12. Risk of Upset

The proposed alternative will have no direct impact on the risk of explosions or release of hazardous substances into the environment. By diverting development from stream environment zones, it decreases the possibility that sewage spills, leaks of chemicals from service stations, or chemicals spilled from vehicles will reach surface waters.

13. Human Health Hazards

As noted above, the proposed alternative will decrease human health hazards by reducing the risks from geological hazards, fires, floods, and chemical spills.

14. Energy and Resource Consumption

Because the total number of residential and commercial units which may be constructed during the implementation period of the proposed plan is limited by the bi-state compact, the Basin-wide demand for energy and materials should not change as a result of the development restrictions. There may be changes in the type of energy used,

depending on the local availability of natural gas versus liquid petroleum fuels, etc. High erosion hazard lands farther from the lake have more severe microclimates than areas closer to the lake, so that there may be some slight reduction in heat energy demands. Consolidation of development in urbanized areas may reduce the length of residents' shopping and commuting trips, thus saving gasoline.

Energy and resources (rock, asphalt, plants for revegetation) will be consumed during the construction of erosion and runoff control projects. This commitment of energy and resources will be insignificant in relation to the water quality benefits which will result.

15. Aesthetics

The preservation of water quality, open space, and natural ecosystems which will result from implementation of the proposed alternative will preserve and improve opportunities for aesthetic enjoyment of the Tahoe Basin. Permanent restrictions on development would provide greater assurance of protection. Increasing buildout of low erosion hazard lands will affect local views and aesthetics.

Some erosion and runoff control projects will involve structures such as gabions, curbs, and gutters which some people may see as undesirable intrusions into a rural environment. The eroded gullies and denuded slopes which these structures are designed to remedy are also aesthetically undesirable. The revegetation of denuded areas should lead to net aesthetic benefits from such projects.

16. Recreation

By preserving water quality and open space, the proposed alternative should have a net positive effect on opportunities for outdoor recreation in the Tahoe Basin. Stream environment zones and high erosion hazard land will have high priorities for public purchase in programs such as the one funded by the Burton-Santini Act. Some types of recreation, such as ski areas, will be restricted by the requirement of adherence to land capability coverage limits. Variances from the prohibition on construction in stream environment zones may be possible for public recreation projects, such as the U. S. Forest Service stream profile chamber, which by their nature must be located in SEZ's.

Permanent controls on development would provide greater protection for recreational opportunities.

17. Summary of significant impacts

a. Unavoidable adverse impacts

Implementation of the proposed alternative will have a net beneficial impact on the environment of the Tahoe Basin which far outweighs any adverse environmental impacts. All of the adverse environmental impacts identified above can and should be mitigated by the actions of TRPA and/or other agencies.

b. Relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity

The present TRPA plans and ordinances allow development on high erosion hazard lands and in stream environment zones through variances from the land capability coverage system. Such variances have been approved for reasons of equity and economic considerations, to the long-term detriment of the Tahoe Basin's environment and its value as a national resource.

The proposed alternative includes short-term control measures which will preserve fragile lands and protect water quality while plans for long-term environmental control measures are being completed as directed by the revised bi-state compact.

The short-term impacts of implementation of remedial erosion and drainage control measures, (including soil and vegetation disturbance, temporary surface drainage alterations, noise, dust, disruption of traffic and possibly of utility service, and disposal of excavated material) are balanced by the long-term benefits to water quality which will result.

If "long-term productivity" is defined in the ecological sense, the proposed alternative should help to slow the increasingly rapid eutrophication of Lake Tahoe, and to maintain the productivity of the Basin's aquatic and terrestrial ecosystems near natural levels. In particular, the productivity of stream environment zones, and their value as fish and wildlife habitat, will be maintained and enhanced.

c. Significant irreversible or irretrievable commitments of resources involved in proposed project

The amount of land, building materials, and other resources committed to development under the bistate compact will not change as a result of the proposed alternative. The land where development will occur has already been committed to residential or commercial uses by past actions of local and regional governments.

New commitments of energy and resources will be required by erosion and drainage control projects, but these commitments are insignificant when compared to the environmental benefits of the projects.

d. Cumulative impacts of the project

The proposed control measures, as they are implemented, will result in a cumulative reduction in sediment and nutrient loadings to surface waters of the Tahoe Basin. The redistribution of development resulting from the proposed restrictions may cumulatively increase the impacts of urban development in some areas, possibly including local increases in traffic congestion, noise, air pollution, visual degradation, and demand on public services. These impacts will be relatively minor, and there will be no Basin-wide increase in such urban impacts as a result of the proposed alternative.

e. Growth-inducing impacts of the project

Because the total amount of growth which may occur in the Basin is limited by the revised bi-state compact over the period in which the proposed alternative will be implemented, the project will have no growth-inducing impacts in the Basin. If enforced on a permanent basis, the proposed restrictions could contribute to "spillover" in portions of California and Nevada adjoining the Basin. The impacts of "spillover" are analyzed in EPA (1979), and SWRCB (1980). The latter report concludes (page 285) that "the environmental damage from allowing increased growth in the Basin, especially increased water pollution from erosion, far outweighs the damage threatened by growth pressures outside the Basin", and also concludes that feasible mitigation measures for spillover impacts are available. Because the proposed alternative will redistribute development, rather than limit the total amount of development in the Basin, it will not contribute to spillover during the period it is in effect.

SECTION VI. MITIGATION MEASURES/ALTERNATIVES TO PROPOSED ACTION

A. General Considerations

The proposed alternative is in itself a mitigation measure for the impact on the Basin's water quality of past and future human activities. The TRPA environmental assessment (1977), the EPA (1979) impact statement, and the CTRPA plan update EIR (1980b.) all recommend the protection of SEZ's and high erosion hazard lands as a mitigation measure for several different types of environmental impacts, including those on water quality.

The SWRCB Water Quality Plan contains ample evidence that the proposed controls on development and remedial erosion control measures are the minimum actions needed to prevent further degradation of Lake Tahoe's water quality and to satisfy the legal requirements of federal and state non-degradation policies. Implementation of alternative 1 (retention of the existing TRPA water quality plan) would not satisfy these requirements, and would be environmentally detrimental in other ways. Alternative 3a, permanent development restrictions and a TRPA regulatory program to enforce remedial controls, would extend the protection provided by the proposed alternative beyond the 1983 date.

The mitigation measures which are discussed below are general in nature. Site-specific mitigation measures will be required as part of the environmental review of individual projects. State or local agencies may require more stringent mitigation measures during their review of the projects. Although the revised bi-state compact does not require environmental impact statements to address mitigation of social and economic impacts of proposed projects, this Chapter sets forth possible means of mitigating social and economic, as well as environmental impacts.

B. Specific Mitigation Measures

1. Land (soils and geology)

The use of best management practices (BMP's), outlined in TRPA's "Handbook of Best Management Practices" (Vol. II, TRPA, 1977) and modified as needed for specific projects, will be required to mitigate the effects of soil disturbance during construction activities. In addition, the Lahontan Regional Water Quality Control Board will require reports of waste discharge, and may prescribe waste discharge requirements, for projects in California.

The proposed alternative includes an offset policy, to require the correction of existing erosion and drainage control problems as a condition of approval for further development. Thus, any increases in erosion and sediment yield which occur due to certain actions of the proposed alternative will require implementation of remedial

control measures to completely offset these impacts. This offset policy, however, will not result in substantial net reduction of erosion and soil loss within the Lake Tahoe Basin. Only a full program to implement all necessary remedial erosion and urban runoff control measures will result in substantial net improvement. Thus, while the proposed program will completely offset any new increase in erosion and soil loss, overall net improvement in erosion and soil loss rates will not occur unless substantial implementation of Phase I erosion control projects described in Section III-F of this document takes place. For net improvement to occur, implementation of remedial erosion controls beyond that necessary for a direct one to one offset will be required.

Soil excavated from construction sites and other construction debris should be disposed of in approved sites where further environmental effects will be minimal.

Building codes should be enforced, and zoning modified as necessary to protect permitted development from seismic hazards.

2. Land use

The proposed alternative will result in restrictions on presently permitted land uses. The restrictions are necessary to protect water quality. Appropriate changes in TRPA ordinances will be made to implement the restrictions, and the revised Regional Plan will result in permanent land use controls based on environmental thresholds. On balance, the environmental impacts on land use of concentrating development on high capability lands in existing urbanized areas is beneficial, and no mitigation measures are required to assure attainment of standards for the Lake Tahoe Basin.

While the proposed alternative will not result in a "spillover" of development, adoption of development restrictions on a permanent basis could have an adverse impact on land use outside the Lake Tahoe Basin. Spillover growth in areas adjacent to the Tahoe Basin can be avoided by regulating the growth of large businesses, such as casinos, which increase the number of potential commuters to the Basin. Spillover development can be mitigated by appropriate changes in county and city plans and zoning. In California, the Lahontan Regional Water Quality Control Board can mitigate the effects of spillover development on water quality of the Truckee and Alpine County areas by means of appropriate waste discharge requirements.

3. Planning

No general planning is required to mitigate the impacts of the proposed alternative. Specific planning activities will be required to address issues which are raised as part of the plan implementation process.

4. Public services and utilities

There is a slight potential that the restrictions on development of fragile lands set by its proposed alternative could cause certain vacant lot owners to abandon payment of their utility assessments and thus endanger the financial integrity of certain utility districts. This potential result is highly unlikely for two reasons. First, the average assessments on affected land are less than $1,000, as compared to an average lot value of $15,000. By defaulting on their utility assessments, lot owners would give up their ability to obtain remuneration through land purchase programs or transfer of development rights. Second, the prohibitions and restrictions on land development, as contained in the proposed alternative, may be enforced for only a limited time. It is very doubtful that individual lot owners would jeopardize their investment in the lot itself through abandoning payment of their utility assessments, especially in view of the temporary nature of the proposed restrictions.

The financial integrity of the utility districts could also be protected through a program to pay for utility assessments themselves. This program could reimburse the property owner for assessments already payed and assume responsibility for outstanding assessments, independent of purchase of the land itself. The assessments would be made in exchange for any right the land owner claims to connect to the utilities for which the assessment were imposed, a transaction which amounts to a purchase of development rights. The payments would be made on a willing seller basis and would not preclude the seller from obtaining complete compensation by selling the land to a public agency at a later date. Paying for special assessments can assure that all property owners affected by development restrictions receive some relief, while efforts continue to obtain the funding needed for a complete land purchase program.

The complete land purchase program is discussed under the Population, Housing and Economy Section below.

5. Transportation

Temporary traffic congestion caused by remedial erosin control project construction activities can be mitigated by scheduling work outside of peak traffic hours. Other mitigation measures for these effects include traffic control measures, safety barriers with lights as needed, and notification of landowners whose access may be blocked.

Increases in urban traffic congestion caused by the redistribution of development can be alleviated by implementation of regional transportation and nonattainment air quality plans, which include such control measures as better public transportation, traffic flow improvements, and neighborhood mail delivery. The revised bi-state compact gives specific directions for transportation planning by TRPA, which include de-emphasis of the automobile. The proposed

alternative allows exceptions to development restrictions for projects which are necessary for the completion of a regional transportation system (e.g., bike trails). Limitations on visitor traffic, by means of a basin user fee coupled with public transit, limitations on expansion of casino parking facilities, or other measures suggested in previous transportation and air quality plans, could greatly alleviate traffic congestion.

6. Population, Housing and Economy

The major economic impact of the proposal is the adverse financial impact on owners of lands restricted from development by the proposed alternatives. While this impact is moderated by the temporary nature of the restrictions as proposed, the real estate market anticipates future actions and could operate to discount the values of affected land even before this temporary action is actually taken (as discussed in the Recht Hausrath, 1980 report). The adverse impact on affected property owners could be effectively mitigated by a land purchase program, a program for transfer of development credit, or some combination of both. Such mitigation programs are extensively discussed in the CTRPA 1980 Regional Plan (pages 46-56), amd the SWRCB's Water Quality Plan (pages 249-253). The passage of the Santini-Burton action into law will generate funds from the sale of federal lands in Nevada to be used in part for acquisition of Basin lands. Thus the potential for implementation of a purchase program seems assured. It is, however, unclear whether these funds will be sufficient or will be available early enough to purchase all lands potentially affected by the proposed restrictions.

A program of transfer of development credits would complement and reinforce a public purchase program. Under the provisions of the CTRPA Regional Plan such a program for transfer of development credits is in place in California. A similar system should be established in Nevada. While the proposed alternative requires consideration of transfer of development credits as part of the preparation of detailed management plans, it does not specifically address transfer of development credits during the period before a revised Regional Plan is adopted.

It is recommended that as mitigation of the economic impacts of the proposed alternative a transfer of development credit system be adopted as part of the Water Quality Plan amendments and implementing ordinances. Such a development credit system could take several different forms, including:

- A requirement that, as a prerequisite to development approval, owners of lots which can be developed under the proposed alternative purchase and permanently retire the development rights of lots which could not developed as a result of the proposed restrictions. Execeptions could be made for development of affordable housing or to take into account other social, economic and environmental considerations.

- A permit allocation system, under which a limited number of permits are issued each year on a random basis. Owners of lots

where development would be precluded by the proposed alternative would be allowed to transfer permits to high capability lots on condition that the lot from which development credit is transferred be permanently restricted from development.

It is further recommended that each local jurisdiction be allowed to adopt its own transfer of development credit system, subject to general guidance by TRPA. If a local jurisdiction fails to adopt such a system, TRPA should adopt a system for that jurisdiction. Adoption of a transfer of development system would assure that even where development of a lot is prohibited on a permanent basis, the lot will still have considerable economic value.

7. Water Quality/Quantity

Development restrictions and remedial erosion and urban runoff control measures contained in the proposed alternative, if implemented, will result in a net reduction in sediment and nutrient loadings to Lake Tahoe. If development and construction activities were allowed to proceed according to the existing TRPA general plan and ordinances, which do not contain these controls, further increases in sediment and nutrient loading would occur.

Application of more stringent or permanent control measures would result in greater protection to water quality of the Lake Tahoe Basin than would the proposed alternative.

All development which is allowed under the proposed alternative will require application of best management practices (BMP's) as required by the "Handbook of Best Management Practices" (TRPA, 1977, Vol. II). This will keep any adverse impacts associated with specific development to a minimum.

Localized short-term degradation may occur during specific construction activities. The magnitude of these impacts is related to the magnitude of random hydrologic events. The application of site specific BMP's will minimize any adverse impacts.

The proposed alternative will not have any substantial long-term adverse impacts upon water availability. Hence, no long-term mitigation measures will be required. Construction of remedial erosion control projects may place short-term demands on water systems for irrigation water. To the extent that only limited water supplies are available within specific systems, remedial erosion control measures may be placed in competition with future development for these supplies. This impact can be minimized by relying on remedial methods which do not require substantial irrigation waters. For example, revegetation projects should rely on drought tolerant plant species to the greatest possible extent. In addition, those water systems which are nearing their limit of available water supply should be identified. This has already been accomplished for

the California portion of the Lake Tahoe Basin (SWRCB, 1979). A plan should be prepared to identify any conflicting water demands between future development and remedial projects which are anticipated within these systems. A program for allocating limited water supplies between the competing uses should be prepared.

8. Air quality

The mitigation measures suggested for transportation impacts will also mitigate impacts on air quality. Proper emission controls can be required for construction equipment used in remedial erosion and drainage control projects, and dust control measures such as sprinkling can be employed. Revegetation will ultimately provide permanent dust control.

9. Biota

Data on the distribution of rare and endangered plant and animal species should be continually updated as part of the TRPA planning process. The environmental review of individual development projects should include onsite surveys by qualified personnel to detect sensitive species. TRPA ordinances and regulatory programs should ensure maximum protection of vegetation during grading and construction. Facilities planning for erosion control projects should include efforts to minimize the disturbance of existing vegetation. The use of native plants for revegetation should be emphasized, and TRPA should encourage further scientific research on identification and propagation of desirable native species for revegetation. The regulations of TRPA and other agencies affecting grazing, silviculture, and off-road vehicle use should be strictly enforced.

10. Significant environmentally sensitive areas

The management plans for areas which are preserved from urban development under the proposed alternative should emphasize their protection against recreational overuse.

Onsite review of proposed development and remedial control projects should be done to identify rare or endangered biota and archaeological or historical sites. If such sensitive resources are identified, the project should be disapproved or modified to protect the resources. Public purchase, transfer of development rights, and protective easements should be emphasized. EPA (1979) stresses that transplantation of rare plants is rarely successful because of their narrow habitat requirements, and that it should not be considered an effective mitigation measure.

11. Noise

Noise levels in the Basin could be regulated by a uniform TRPA noise ordinance, and should be considered in ongoing development review. The mitigation measures for transportation and air quality impacts which are discussed above should reduce noise from automobile traffic. Zoning could be used to direct development away from high noise areas (e.g., airports). Other possible mitigation measures include special use permits for new noise sources and noise barriers along existing highways (EPA, 1979).

Proper mufflers should be required on construction equipment, and construction should be scheduled during hours when the fewest people will be disturbed by noise.

12. Light and Glare

During design review of individual projects, particularly commercial projects, minimization of light and glare should be required.

13. Risk of Upset

No mitigation required.

14. Human Health Hazards

No mitigation required.

15. Energy and Resource Consumption

Enforcement of building codes can ensure that permitted development is energy efficient. Mitigation measures for transportation and air quality will help to minimize energy consumption by automobiles in the basin.

16. Aesthetics

Design review of new development, particularly of commercial structures, should include attention to aesthetic impacts. Zoning changes and land purchase or easement programs should be considered to protect scenic view corridors in urban areas. Facilities planning for erosion and drainage control projects should emphasize structural controls which are aesthetically pleasing, or at least neutral in their impact.

17. Recreation

The proposed alternative includes provisions for variances from development restrictions for projects which are found to be necessary for public recreation. Public purchase of high erosion hazard and stream environment zone lands, and their use for dispersed recreation, should be given high priority, and private land owners should be encouraged to manage their lands for low intensity recreation within the constraints of applicable plans and ordinances.

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Documents incorporated by reference into this EIS are available for review at the offices of the:

Tahoe Regional Planning Agency
2155 South Avenue, Box 8896
South Lake Tahoe, CA 95731
(916) 541-0246

ADDENDUM TO

DRAFT ENVIRONMENTAL IMPACT STATEMENT

LAKE TAHOE BASIN

WATER QUALITY MANAGEMENT PLAN

TAHOE REGIONAL PLANNING AGENCY

APRIL 1981

TAHOE REGIONAL PLANNING AGENCY

P.O. Box 8896
South Lake Tahoe, California 95731

2155 South Avenue

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NOTICE OF ADDENDUM
TO DRAFT ENVIRONMENTAL IMPACT STATEMENT

LAKE TAHOE BASIN WATER QUALITY MANAGEMENT PLAN
TAHOE REGIONAL PLANNING AGENCY - APRIL, 1981

Attached please find an addendum to the Draft Environmental Impact Statement prepared for the Lake Tahoe Basin Water Quality Management Plan of the Tahoe Regional Planning Agency. This supplement is being circulated at the direction of the TRPA Governing Body to address the public comments received to date regarding the impacts of a case-by-case review of development on properties in land capability levels 1, 2, and 3, and to address the impacts on water quality of retaining coverage overides in the Lake Tahoe Basin.

Written comments should be received on the Draft Environmental Impact Statement by April 22, 1981. A public hearing to consider the amendments to the Tahoe Regional Planning Agency's Lake Tahoe Basin Water Quality Management (208) Plan, to consider ordinances to implement these proposed amendments, and to certify the environmental documents to amend the TRPA's 208 Plan will be conducted at 2:00 p.m. and at 7:00 p.m. on April 22, 1981, at the Sequoia Ballroom of the Sahara Tahoe Hotel, Stateline, Nevada.

All interested persons are invited to attend said public hearing and present evidence concerning these matters. For further information, contact the office of the Tahoe Regional Planning Agency, 2155 South Avenue, P.O. Box 8896, South Lake Tahoe, CA 95731, (916) 541-0246.

Dated: April 9, 1981

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SECTION I. INTRODUCTION

A draft Environmental Impact Statement (EIS) on proposed amendments to the Tahoe Regional Planning Agency's "Lake Tahoe Basin Water Quality Management Plan" (208 Plan) and implementing ordinances was prepared and circulated for public review in February, 1981. The proposed amendments would impose a number of restrictions on development within the Lake Tahoe Basin during the time between their adoption and the adoption of a new Tahoe Regional Planning Agency (TRPA) regional plan in 1983. Included in the proposed restrictions (page 85 of the draft EIS) is a prohibition on the development of lots in land capability classes 1 and 2, with a provision for case by case review of class 3 lots to determine whether they are buildable within land capability coverage limits. The proposed requirement for adherence to the land capability system does not count coverage by existing subdivision roads in determining allowable coverage on each lot. Land capability challenges are permitted, although the proposed amendments eliminate the categorical variances or coverage overrides from the land capability system allowed by previous TRPA plans and ordinances. The allowance of overrides has been identified as a major defect of the existing TRPA 208 Plan and is a major contributor to continuing water quality deterioration in the Lake Tahoe Basin.

Critics of the proposed amendments have suggested that TRPA should review all lots in restricted capability classes on a case by case basis, and that it should consider allowing coverage overrides where landowners commit themselves to implement stringent erosion and surface runoff control measures. The purpose of this addendum to the EIS is to present a number of possible alternatives for such "case-by-case review", to discuss their feasibility, and to assess their environmental impacts.

"Case-by-case review" of allowable coverage should be distinguished from on-site inspection to verify land capability classification. It is recognized that TRPA's land capability maps are general planning tools, and that a specific parcel may have different capability than the one mapped for its general area. Field inspections will be made of all parcels which are allocated building or sewer permits under the provisions of the bistate compact before development restrictions are applied. TRPA's ordinances do not exempt construction proposed on land capability classes 1, 2, 3, and in Stream Environment Zones from the requirements for preparation of an Environmental Impact Statement (Ordinance 81-1).

The impacts of allowing development on high hazard lands are discussed in the EIS for Alternative 1, existing TRPA plans and ordinances, described on page 84. This addendum reemphasizes the significant impacts which would occur if coverage overrides were permitted. As in the EIS, incorporation by reference of more detailed documents is used.

SECTION II: IMPLEMENTATION OF THE LAND CAPABILITY SYSTEM

The land capability system for the Tahoe Basin as described by Bailey (1974) invoked controls on the areal extent of impervious cover as the primary means of maintaining environmental balance and avoiding "...water quality degradation flooding, and soil erosion." Dr. Bailey considers that "Control of impervious surface...is the most accurately measureable and constant expression of development impact." The brief discussion that follows is based upon Leonard, Coats, and Munn (1980) and provides a better understanding of the scientific basis for the use of land disturbance controls in the protection of water quality in streams, groundwater and the lake itself than can be obtained from the Bailey publication. Three major topics are dealt with below as they relate to the movement of water and nutrients into and through the Tahoe Basin ecosystem: 1) hydrology and geomorphology, 2) nutrient cycling, and 3) maintenance of vegetation.

A. Hydrologic Effects of Development

In general, the disturbance associated with land development in the basin falls into two categories. These are 1) the creation of impervious or severely compacted surfaces and 2) the alteration or replacement of existing vegetation by a different plant species or community. Since these types of modifications have somewhat different hydrologic and water quality impacts, they may be treated separately.

The modification of vegetation often involves replacement of trees by lawn or destruction of a litter layer under a stand of conifers. Such modifications are hydrologically significant for several reasons. First, removal of a tree canopy eliminates crown interception, so that more precipitation (especially snow) reaches the ground directly. Second, removal or destruction of the leaf litter layer may expose the mineral soil directly to the impact of rain drops or running water. With proper techniques of vegetation management, the effects of vegetation removal only sometimes can be mitigated if site protection and maintenance are effective after disturbance. Generally this will require intense on-site management and a comprehensive operation and maintenance program.

The hydrologic effects of paving and deep compaction, however, far outweigh the hydrologic effects of vegetation alteration. These effects extend off site and may involve "snowball" effects, so that the net cumulative effect of erosion and sedimentation in a catchment or drainage basin actually exceeds the sum of the effects attributable to individual disturbances.

The mechanisms involved in these modifications are complex. Paving and heavy compaction reduce the infiltration of snowmelt and storm runoff to zero, thus increasing surface runoff. This new surface runoff then may contribute to gully or streambank erosion offsite. The problem is compounded by gutters, drains and storm sewers which are constructed to handle the increased surface runoff. These structures route surface runoff (including runoff from adjacent

undisturbed land) more directly to stream channels, thus decreasing the concentration time of stormflow. The result is higher stormflow volumes, which increase gully and streambank erosion. A new system of gullies may in turn increase flow velocities and further decrease concentration time; streambank erosion may then change the elevation of the streambed downstream, thus leading to progressive upstream bank erosion. No known system has been shown to be effective in mitigating these impacts. The provision of infiltration trenches designed to accept runoff from impervious and compacted surfaces is only partially effective. No infiltration facility can be designed to accomodate all possible storm runoff situations. Very large infiltration systems, although able to accomodate a large amount of runoff, create very extensive soil disturbance as a result of their own construction. Infiltration systems require constant maintenance in perpetuity.

The percent of total impervious and compacted surface created within a defined drainage area is the most important variable. Other hydrologic variables are also important, however. These include 1) the location of paving or compaction in relation to the channel network; 2) the location and size of drains and storm sewers; 3) the shape and orientation of the impervious area; and 4) the relative continuity of the impervious area.

The significance of these processes has been documented for both urban and forested areas. Rantz (1971) estimated the relative increase in flood peak magnitude associated with increases in impervious surface and increases in channelization. For example, developing half of a catchment and putting half of the channels in storm sewers roughly doubles the magnitude of flood peaks with a two year recurrence interval. In studies on the hydrologic effects of logging and road building, Harr et al. (1975; 1979) found that if 12-15 percent of a watershed is compacted or occupied by roads and landings, then large as well as small stormflow peaks may be increased. Compaction due to logging activities was estimated to be capable of decreasing the recurrence interval of the "35 year flood" to 15 years.

Aside from the effects of impervious surfaces on stormflow, the disturbance associated with construction may by itself accelerate erosion. During construction, vegetation removal and soil disturbance are inevitable. On many of the soils of the Basin, recovery of vegetation may be extremely slow. During the recovery period, the exposed soil is vulnerable to accelerated sheet, rill and gully erosion. This problem is to some degree amenable to mitigation with proper construction techniques.

In some parts of the Basin, a considerable hazard of mass movement exists. Soils prone to earthflows, debris avalanches and debris torrents occur on oversteepened glaciated and streamcut volcanic flowlands on the north and northwest sides of the Basin. Road construction or other development activities that impinge on such slopes incur a risk of triggering mass movement. Such events create not only a potential water quality problem but also pose a direct physical threat to buildings and related facilities.

The relative continuity of the impervious surface in a watershed is an extremely important and often overlooked factor. Ideal implementation of the land capability system would allow only a relatively uniform distribution of the maximum permitted coverage in a particular land capability class. Concentration of all the allowed coverage in a small portion of a particular land class does not meet the intent of the land capability system.

B. Nutrient Cycling

The major nutrients that are required for the growth of green plants, from algae to redwoods, are obtained from the air, water and soil. Of the nutrient elements that are required in relatively large quantities, nitrogen and phosphorus are most often in short supply and thus may limit the productivity of plants in both the terrestrial and aquatic environments.

Nitrogen fixation is a biological process that occurs in the root zone of several plant species at Tahoe including alders and legumes. Atmospheric nitrogen (which is inert and unavailable to most plants) diffuses into the soil and is "fixed" by microorganisms associated with certain plant roots. The fixation process makes nutrient nitrogen available not only to the microorganisms and the host roots but also to all other trees, shrubs and annuals by means of migration in soil water and other transport mechanisms.

Over periods of many years, usually centuries, forest ecosystems mature and accumulate nitrogen in the form of living and dead organic matter (biomass) plus organic matter in the soil in varying states of decomposition. The organic nitrogen that is stored in the soil is not susceptible to plant uptake or direct leaching by water moving through the soil. The organic nitrogen must first be converted to simpler, soluble forms via processes carried out by microorganisms. Recycling of nitrogen in an undisturbed system is continuous with little net release or leakage of nutrient into adjacent streams and lakes. Alteration of soil and vegetation disrupts the cycling process and can result in temporary or permanent loss of nutrients from the disturbed site.

The most water-soluble product of the breakdown of organic nitrogen is nitrate. Nitrate production can be greatly increased by removal of vegetation and disturbance of the soil (Coats et al., 1976; Perkins et al, 1975). Soil temperatures increase due to loss of shading, and increased light itself may stimulate some microbial processes. The net result on a disturbed site is increased conversion of stored organic nitrogen to highly mobile nitrate, decreased uptake of nitrate by roots, and leaching of nitrate from the site so that it enters either the adjacent surface runoff channels or the ground water. Both lead directly to Lake Tahoe.

In summary, the major sources of nutrient nitrogen in the Tahoe Basin are precipitation and symbiotic nitrogen fixation. These are necessary to a healthy forest/meadow ecosystem. However, physical intervention in the normal cycling of nutrients, by either natural or man-caused events, can result in accelerated and usually undesireable biological productivity in running and standing water due to the transfer of nutrients downslope from the land. Therefore, we must expand our concept of environmental disruption beyond impervious surfaces to "altered soil-vegetation systems."

C. Maintenance of Vegetation

Fertilizers and irrigation water are often used in the Lake Tahoe Basin for the establishment and maintenance of lawns and ornamental plantings. Nutrients escaping from landscape plantings related to existing and potential development in the Basin area add to the total quantity of nutrients moving toward the waters of Lake Tahoe. Mitchell and Reisenauer (1974) have reviewed the overall impact of fertilizers in the Tahoe Basin. The purpose of this section is to address the effects of fertilizer application on the quality of waters leaving individual development sites.

Application of fertilizers compounds at rates recommended for landscape plantings (USDA 1971) can lead to nutrient enrichment of waters leaving treated areas by both downward leaching and surface runoff. The principal nutrient lost by leaching is the nitrate form of nitrogen. Surface runoff can transport any soluble or particulate nutrient. However, since nitrogen has been identified as the primary algal growth stimulating nutrient in the waters of Lake Tahoe, the following discussion will be limited to the behavior of fertilizer nitrogen.

Nitrate is the dominant end product of microbial breakdown of nitrogen compounds in the soil and is also the principal form of nitrogen used by grasses and other ornamental plants. The nitrate ion is not adsorbed by soil materials and thus moves freely with the flow of subsurface water. Plant uptake and use by soil microorganisms are the primary means of nitrate removal from the soil system. Fertilizer nitrogen for irrigation water (in the presence of nitrate) applied in excess of plant use will result in the movement of nitrate below the zone of root uptake and microbial activity. Subsequently, subsurface water movement during periods of snowmelt or high rainfall will then provide off-site transport of the lost fertlizer nitrogen with little or no further opportunity for uptake by vegetation.

Surface runoff of water from fertilized areas can result in direct off-site transport of nutrients. The amount of fertilizer nitrogen carried by runoff is controlled by the rate of nutrient addition, the solubility of nitrogen in the fertilizer compound, and the proportion of added nitrogen which has moved into the soil. The loss of

added nutrients will be greatest when runoff occurs prior to soil incorporation. Under these circumstances, intense or prolonged moderate rainfall or excessive irrigation following fertilization can cause significant off-site nutrient movement in surface runoff.

The fate of nitrogen lost from fertilized areas depends on the method of transport plus the stream or lake proximity and hydrologic characteristics of the treated area. The behavior of nitrate in subsurface waters can be extremely complex; possible outcomes include:

1. If the nitrate remains in shallow (less than about 5 feet deep) subsurface flow which passes through areas of natural or dense, unfertilized vegetation, then uptake and use by plants or soil microbes is likely.

2. If the nitrate is carried into groundwater that does not pass through vegetated areas or is below the influence of plants and soil microbes, then transport as base flow to streams or lakes is likely.

3. If the nitrate passes through a zone of low oxygen content in the presence of organic compounds, then conversion of nitrate into non-nutrient nitrogen gas may occur.

Calculations based on realistic fertilizer application rates and soil organic matter transformations indicate that the potential nitrogen addition is comparable to that released by surface disturbance on a per unit area basis. The overall effect of fertilization on the nitrate inputs to Lake Tahoe by subsurface flow will depend on the amount of area fertilized, irrigation scheduling and amount, plus proximity of treated areas to streams and lakes. The effect of surface runoff from fertilized areas on water quality can be more immediate when nutrient-rich runoff from lawn and shrub areas enters streams and lakes directly.

D. Land Capability Application

The land capability system as correctly applied should limit total development to coverage limitations. Such an application would be termed "strict adherence to land capability". Under such an application, the total disturbance associated with a development would be charged against the allowable coverage limit. Development characteristics chargeable against the coverage limits would generally include the following:

- o all areas of compacted soil
- o highways & subdivision roads
- o utility structures (well houses, power stations, etc.)
- o permanent trails
- o permanent disturbed areas
- o parking lots
- o houses
- o decks
- o garages & driveways
- o walkways
- o miscellaneous structures

Ideally such a system would be applied prior to development design to guide and direct the proper location and density of all forms of structural development. Intense clustering of development would not be permitted under most circumstances. In terms of water quality protection, proper application of the land capability system would require a uniform distribution of allowable coverage over a particular land capability classification. Although insufficient information exists upon which to base a precise limitation, a very limited area, possibly no larger then 10 acres in size, should be the maximum unit for determining land capability adherence. In other words, if any 10-acre portion of a development did not fall within the percent coverage constraints, then the development would not meet the requirements of the land capability system. Allowing dense concentration of development in one portion of a very large parcel could be environmentally damaging.

Strict adherence to land capability poses considerable problems when applied to development which has already taken place. In all but a few situations, significant further development would be completely precluded. In those few existing situations where existing constructed development did not exceed coverage limits, the allocation of remaining allowable coverage would be extremely difficult from a regulatory standpoint.

The proposed alternative water quality management plan currently being considered by the TRPA does not require strict adherence to land capability. Rather, the land capability system is proposed to be applied to new development on a parcel-by-parcel basis. Using this approach, the coverage limitations would not be applied to public roads and utility structures which are located off-site of the parcel or parcels being considered for development. From the standpoint of ease of regulatory application, the proposed alternative is the most sensible. It would, however, mean that existing development would be allowed to proceed in considerable excess of the limitation which would be imposed under the idealized strict adherence to the land capability system. Table 1 depicts the excess

Table 1

APPLICATION OF LAND CAPABILITY COVERAGE ON A PARCEL-BY-PARCEL BASIS IN EXISTING TYPICAL SUBDIVISION DEVELOPMENTS (1/4 ACRE LOTS) WITH CURRENT 50% BUILDOUT

Land Capability Class	Land Capability Coverage	EXISTING DEVELOPMENT		208 BUILDOUT	
		Existing Coverage	Coverage Excess	Potential Coverage	Coverage Excess
1	1%	37%	37 Fold	37%	37 Fold
2	1%	35%	35 Fold	35%	35 Fold
3	5%	32%	6.4 Fold	34%	6.8 Fold
4	20%	32%	1.6 Fold	40%	2.0 Fold
5	25%	32%	1.3 Fold	42%	1.7 Fold
6	30%	32%	1.1 Fold	44%	1.5 Fold
7	30%	32%	1.1 Fold	44%	1.5 Fold

coverage in existing typical subdivisions on the various land capability classes beyond that which would be allowed by strict interpretation of the land capability system. Application of the land capability coverage limitations on a parcel-by-parcel basis would preclude almost all further development on class 1, 2, and 3 lands. An existing 1/4 acre lot subdivision on class 1 lands with 50% buildout will already have resulted in 37% coverage. This is a 37 fold increase above what would have been allowed with strict adherence to the land capability class system. Even full "208" buildout of land capability class 4 through 7 lands will result in a 1.5 to 2 fold increase in coverage beyond strict adherence to land capability.

Figure 1 depicts the amount of coverage and disturbance which has occurred in the Rubicon Properties Subidivision, El Dorado County, California. In addition, the amount of potential coverage and disturbance which is estimated to occur at full buildout is also projected. The entire subdivision development is located on a high hazard geomorphic class (moderately dissected, weakly glaciated lands)and on a high hazard soil type (Meeks very stony, loamy course sand, 30 to 60 percent slope). The area where Rubicon Properties is located is classified in land capability class 1 with a coverage limitation of 1 percent. When the roads for the subdivision were first constructed in 1960, the coverage and disturbance totalled about 30%. Development which has occurred up to the present time (15% of potentially developable lots) has increased the amount of coverage and disturbance to 35 percent. Full development of all existing lots within Rubicon Properties with grandfathered coverage allowance as provided in existing TRPA plans and ordinances would ultimately result in 55 percent coverage and disturbance.

FIGURE 1

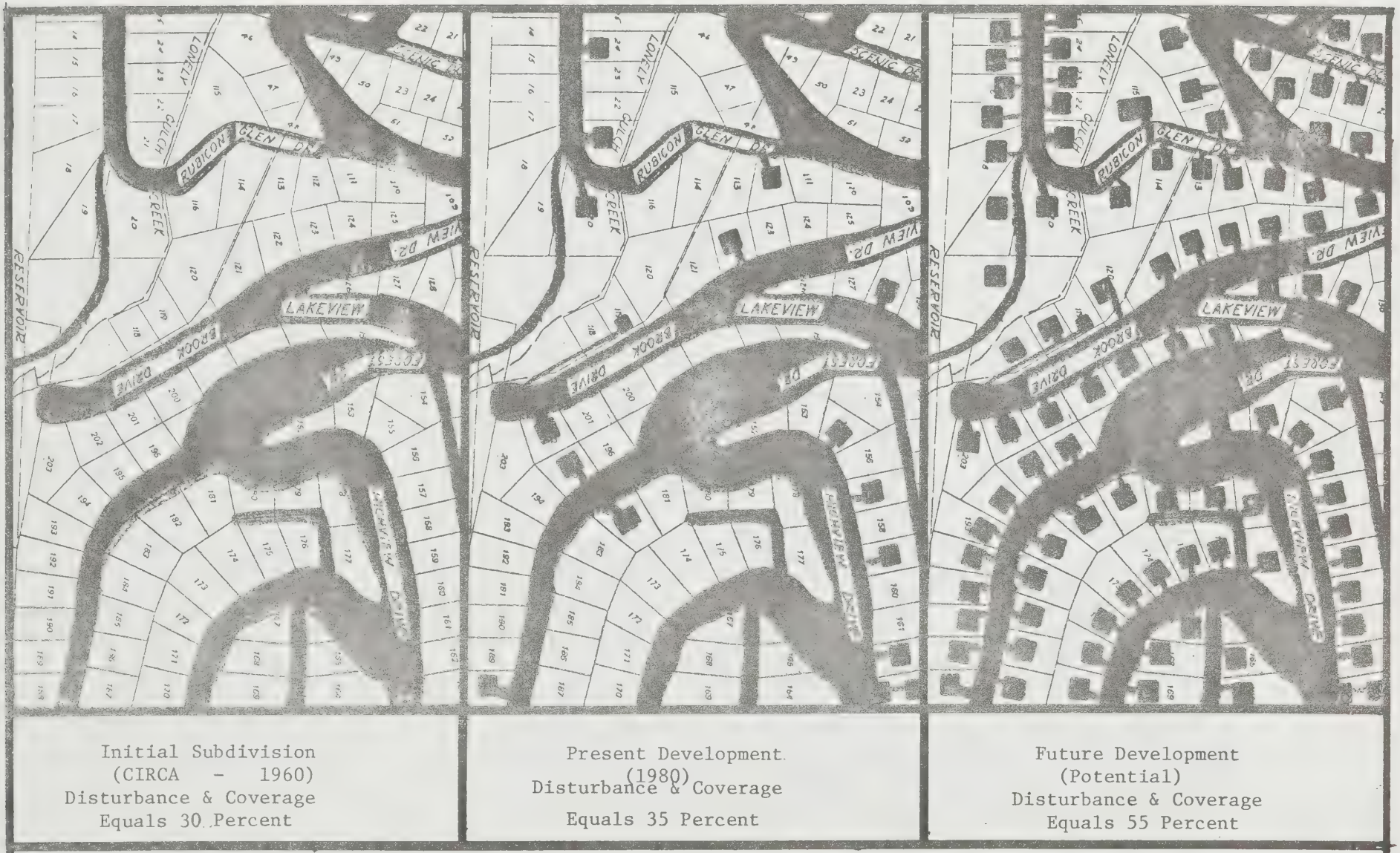

Figure 1: Historical and Projected Development of Rubicon Properties Subdivision, El Dorado County, California without Land Capability Coverage Constraints - Land Capability Class = 1, with Allowable 1% Coverage

SECTION III: CASE STUDIES AND AVAILABLE DATA BASE

The relationship between urbanization and the water quality of Lake Tahoe is extremely complex, yet an understanding of the processes is crucial in order to make rational decisions about future development. Numerous studies have been conducted over the past several years to evaluate the impacts of development in the Lake Tahoe Basin upon water quality. For practical reasons, all studies have been directed towards the evaluation of the cumulative impacts of watershed development. No studies are known to exist which evaluate the site-specific impacts of development on a small scale or on a parcel-by-parcel basis.

A. Cumulative Impact Studies

Many investigators (e.g., California Department of Conservation, 1969; Glancy, 1971 and 1973; TRPA 1977; Leonard et al., 1979; and State Water Resources Control Board, 1980) have shown that the sediment and nutrient content of stream water from urbanized watersheds is significantly higher than stream water from relatively undisturbed watersheds. Relatively few, however, have attempted to quantify this relationship so that nutrient and sediment loads could be projected based on the amount of urbanization within the watershed. Those who have quantified this relationship used regression equations or surface runoff coefficients.

Brown, Skau, and Howe (1973) of the University of Nevada developed regression equations to explain sediment and nutrient productions from 25 watersheds within the Tahoe-Truckee River system. (Eleven of these are within the Lake Tahoe Basin.) Equations were developed for annual sediment concentration, annual orthophosphate, and total nitrogen for three seasons. Forty-eight characteristics of the watershed were considered in the analysis. Most of these factors were natural physical characteristics of the watershed; however, the regression equations which provided the best fit used a maximum of six variables. In each case, one of these significant variables was the percent of the watershed which was urbanized. Increases in sediment and nutrient production can be projected by increasing the urbanization variable in the regression equation. Using this method for projecting the water quality impact of development assumes that future development will have the same average impact as existing development. Variation due to the location of development (e.g., on low versus high land capability) or the use of mitigation measures cannot be estimated.

White and Franks (1978) of the California State Water Resources Control Board (SWRCB) developed regression equations to describe sediment production in two developed watersheds in and adjacent to the Lake Tahoe Basin. Estimates were made of sediment production in each watershed in terms of both pre- and post-development conditions.

One watershed, West Martis Creek, has a wide range of land capability classes associated with it. Prior to development the watershed was extensively logged. Recent residential and commercial development affected about 10% of the entire watershed. Development, however, was restricted to locations and densities similar to the requirements which would be imposed under strict adherence to the land capability system. Best Management Practices for the protection of water quality were applied. The development was found to have resulted in a 2 fold increase in annual sediment production over pre-development conditions. Recent information (SWRCB, 1980) suggests that the pre-development conditions of West Martis Creek, which included the impacts of logging, were actually representative of sediment production which was itself 3 times above what would be expected for natural, pristine conditions. Thus, development of 10% of the West Martis Creek watershed in accordance with land capability in addition to historical logging impacts appears to have resulted in as much as a 6 fold increase in suspended sediment production from that watershed.

A second watershed monitored by White and Franks, Lonely Gulch Creek watershed, was located entirely in land capability class 1 terrain. Historical development (circa 1960) which also affected only about 10% of the watershed, was conducted in considerable excess of the land capability coverage limitations of 1%. Best Management Practices were not applied at the time of development. Sediment production from the watershed was found to be 16 times greater than that under natural pristine conditions due to the impacts of development which had occured over 15 years earlier. Estimates of sedimentation which may have occured immediately after initial development indicated annual sediment production levels of over 100 times that occurring under natural pristine conditions. Major conclusions of the White and Franks report included the following recommendations to insure that sediment production from developing watersheds would be minimized:

1. adherence to land capability system

2. minimizing disturbed surfaces, and

3. prohibition of development in Stream Environment Zones

In addition, the White and Franks report documented that, although rainstorms may account for only a small portion of the annual runoff generated in the disturbed watershed (less than 2%), the total sediment production due to rainstorms may exceed 40% of the total annual suspended sediment load.

The California State Water Resources Control Board's Lake Tahoe Basin Water Quality Plan (1980), which is discussed in the draft TRPA EIS, also provides a detailed analysis of the impacts of development and land capability on sediment and nutrient production from Lake Tahoe watersheds. Analysis of annual water quality data from 19 watersheds in and around the Lake Tahoe area shows a strong relationship between suspended sediment production and two primary

factors: degree of urbanization and land capability classification. Nutrient production levels are also shown to vary in accordance with suspended sediment production from various watersheds in the Lake Tahoe Basin.

B. Case-By-Case Evaluations

No water quality monitoring data exist which document site-specific impacts of the development of individual lots. The only data which have been collected have shown the cumulative impacts of development upon watersheds as a whole. The closest process to individual evaluation of building sites occurred as part of the California Tahoe Regional Planning Agency's (CTRPA's) case-by-case review of lots which were affected by its 1980 urgency ordinance which which restricted development on low land capability classes.

The Urgency Ordinance

At its May 2, 1980 meeting, the CTRPA Governing Board called for a lot by lot review of all properties that had been allocated sewer permits but were characterized as being environmentally fragile. These designations were based on the land capablity system. Land within the Basin was assigned to capability classes numbered from 1 to 7 with the lower numbers given to the properties where development is most likely to create environmental problems. The CTRPA Board had, at that time, a restriction on any form of development in Land Capability Classes 1 through 3 and in Stream Environment Zones.

As directed by the CTRPA Governing Board, the CTRPA staff undertook a case-by-case review of lots in land capability classes 1-3 and Stream Environment Zones which had received sewer permit allocations from local jurisdictions. Following the May meeting, the CTRPA staff notified property owners of their Board's action. Owners were asked to stake the boundaries of their properties so they could be clearly identified.

Review Criteria

To review the lots in an objective and consistent manner, the CTRPA staff developed a set of review criteria. The review criteria consist of four categories: vegetative cover; proximity to stream or wet land; runoff potential and land stability. These criteria are appended to this report. The criteria were presented to the Board on June 6, 1980, following a site review of a representative cross section of applications. The criteria used to rate sites in their degree of potential harm to the Lake's water quality were endorsed by the Board at that meeting.

Permit Categories

Most sites were visited at least once and, based upon this review, the CTRPA staff identified eight general categories of permits. These categories are generally described as follows:

1. Steep Slope: These areas range between 30-60% slope and contain some lots with steep road banks or fills causing access difficulties. These areas are a major source of sediment that causes damage to streams and the Lake. Classes 1a, 1c, and 2 are the typical land capability classifications that encompass these areas. Due to the sensitive nature of these areas, the CTRPA staff concluded that there is no feasible mitigation that would significantly reduce potential adverse environmental impacts anticipated from development of these types of lands. These are areas identified in the land capability system as areas not suited for development.

2. Stream Environment Zones: These are lands naturally wet and/or poorly drained such as marshes, meadows, streams and floodplains. They are valuable as floodwater storage areas, sediment traps and as wildlife habitat. Class 1b is the typical land capability designation of these areas. The 208 Reports on Lake Tahoe identify these areas as critical environments for water quality protection and CTRPA staff felt that there are no feasible mitigation measures that will significantly reduce potential adverse environmental impacts anticipated from development of these areas.

3. Moderate Class 1a and 2: These areas generally met the land capability classification criteria, however, they fall at the low to moderate end of the range. For example, slopes may be less than 20%. Although the areas generally exhibit the class 1 and 2 characteristics, islands of less steep land may exist where a building could be sited with fewer environmental impacts than development of adjacent lands. These types of sites were only released with prescription of strict control standards on land coverage, vegetation removal, erosion hazard and site rehabilitation (including re-vegetation).

4. Class 3: The slope of these lands varies from 9-30% and vegetation is from scattered to dense. The CTRPA staff identified two sub-categories:

   (a) Typical class 3 - Those areas in excess of 15% slope that meet the class 3 characteristics. These types of lots were not released since they meet the land capability class 3 criteria. The CTRPA staff did not feel that impacts could be adequately mitigated on these types of lots unless there was strict adherence to land capability standards.

   (b) Moderate - Those areas less than 15% slope with no access or drainage problems. These areas are borderline cases but have not been released since they exhibit the class 3 criteria although at the low to moderate end of the range. These permits were only released with more restrictive land coverage and vegetation removal standards. Re-vegetation was also necessary in some areas.

5. Substantial Vegetation Removal: These lots were densely covered with vegetation and construction required removal of a significant amount of vegetation. Maintenance of vegetation is important in minimizing erosion and retaining soluble nutrients that could otherwise enter streams and the Lake. The CTRPA staff felt that development of these lots would require significant vegetation removal regardless of conditions and that they should not be released.

6. Access Difficulties: Some sites, due to the roads constructed to serve the subdivision, pose access problems. Many of the sites would require a significant amount of excavation to meet county standards for parking and setback, but otherwise pose no serious building difficulties. Mechanical stabilization of the access is essential in these areas, however, the CTRPA staff felt that due to setbacks and parking standards, a significant amount of excavation would be required with development of these sites. Release of these types of permits was only considered with detailed plans for stabilization of excavated areas and significant reductions in parking and setbacks.

7. Not Within Developed Areas: CTRPA's staff had difficulty locating some lots because they are not on improved roads. Providing access to these lots or extending utilities through other fragile areas would require a significant amount of disturbance and would be harmful to Lake Tahoe. These types of sites would only be released if a graded road already exists to serve the lot, utilities do not have to be extended through other fragile lands and the road is improved to minimize erosion and runoff.

8. Tahoe Keys: 23 sites received 1980 sewer allocations within the Tahoe Keys subdivision. The Tahoe Keys was a marsh and meadow that was dredged, filled and transformed into a residential subdivision. The entire subdivision is within the Stream Environment Zone. The CTRPA staff felt that many of the natural functions are still being performed in the Keys and that continued development of the remaining vacant lots would not be beneficial to the Lake's water quality. The eutrophication (algae growth) within the lagoon indicates the amount of nutrients being added to the area. CTRPA staff did not recommend that permits in this area be released at that time. Many of the Tahoe Keys lots, however, were ultimately released for development by the CTRPA Governing Board.

The Appeal Procedure

The CTRPA staff placed individual permit applications within those categories reviewed by the Governing Board and notified the applicant of staff's determination, including a discussion of the site development problems. Also included in the notification was a discussion of the procedures for filing an appeal. Persons filing an appeal were asked to provide written response to staff's determination along with any additional information that they felt was appropriate.

Summary of 1980 CTRPA Review

Table 2 depicts the results of the CTRPA 1980 case-by-case review of environmentally sensitive lots. Almost 70% of the lots subjected to this review were released either by the CTRPA staff or by the Governing Board. Approximately 34% (80 lots) were released by the CTRPA staff prior to Governing Board review. It should be noted that these releases were made for purposes of equity and not for purposes of water quality improvement or control. The lot review program was undertaken by CTRPA in fairness to lot owners who had already received sewer permits pursuant to local government random selection allocation systems. The CTRPA fully realized that the environment and water quality of the Lake Tahoe Basin would suffer and that the cumulative effect of development on these sensitive lots would not be considered.

A case-by-case review cannot take into consideration the cumulative effects of devloping sensitive land in that applications are viewed individually. The interrelationship of the parcel to the surrounding land or geomorphic unit is not assessed when the scope of review is narrowed to an individual parcel. The allowable coverage limits set by the land capability system are based in part on the threat of erosion downslope from areas where impervious surfaces increase surface runoff. Case-by-case review does not take into account these off-site impacts. Viewed on an individual basis, a project may not seem to cause a significant adverse impact, but when viewed within hundreds of similar proposals, the outlook may be different. Removal of vegetation and creation of impervious surface within these sensitive areas, as outlined in other sections of this EIS, cause significant increases in sedimentation and degradation of water quality.

As documented by the CTRPA experience, reliance upon a case-by-case approach has serious shortcomings in that there is no practical method to ensure long-term maintenance or operation of erosion and drainage control devises or to ensure that they are even properly installed in the first place. Typically, the environmental damage has occurred prior to the discovery of the problem. Once areas are disturbed and vegetation is removed, particularly in class 1 and 2 areas, nutrients are released and stabilization and revegetation becomes extremely difficult. The CTRPA experience with the case-by-case review, indicates that few proposals conform to land capability standards. Since many of the structures approved on a case-by-case basis in 1980 have not yet been built, there has been little opportunity for specific documentation of their environmental impacts or the effectiveness of mitigation measures.

While CTRPA released a majority of permits under the case-by-case review process, based upon hardships and equity considerations (local government did not initially allow the transfer of sewer permits), few lots were found to be improperly classified under the land capability system.

Table 2

SUMMARY

1980 CTRPA LOT REVIEW

Lots Reviewed			
City of South Lake Tahoe			57
El Dorado County			52
TCPUD			91
NTPUD			37
TOTAL LOTS REVIEWED		=	237
Lots Released			
City of South Lake Tahoe			45
El Dorado County			30
TCPUD			61
NTPUD			27
TOTAL LOTS RELEASED			
Staff:	80		
Governing Board:	83	=	163
Lots Not Released			
City of South Lake Tahoe			9
El Dorado County			18
TCPUD			29
NTPUD			9
TOTAL LOTS NOT RELEASED			
Staff (no appeal):	38		
Governing Board:	27	=	65
Lots Not Staked			
City of South Lake Tahoe			3
El Dorado County			4
TCPUD			1
NTPUD			1
TOTAL LOTS NOT STAKED		=	9

SECTION IV: ALTERNATIVE ACTIONS FOR CASE-BY-CASE REVIEW OF DEVELOPMENT PROPOSALS FOR INDIVIDUAL LOTS

A full range of alternative control actions are described in Section III of the draft Environmental Impact Statement of the Lake Tahoe Basin Water Quality Management Plan released in February, 1981 (draft EIS). Alternative proposals for case-by-case review of development proposals for individual lots were not extensively considered as part of that draft EIS. This supplementary document discusses alternative case-by-case review actions. As such these "sub-alternatives" should be viewed as modification to the following sets of control actions:

- Management of High Hazard Land and High Runoff Hazard Lands
- Land Capability and Coverage Limitations

These sets of alternative actions are described on pages 84 through 89 of the draft EIS. Of the above two sets of proposed control actions, the following individual actions are recommended for adoption by the TRPA Governing Board as part of the Lake Tahoe Basin Water Quality Management Plan.

- Prohibition and Development Controls on High Erosion and High Runoff Hazard Lands

  This alternative action would prohibit development activities on land capability classes 1a, 1c, and 2 until adoption of a revised TRPA Regional Plan as required by the amended bi-state compact. Development on land capability class 3 would be reviewed on a case-by-case basis to permit development consistent with the other requirements of this Water Quality Management Plan.

- Controls Imposing Land Capability System on Individual Parcels

  This alternative would require future development and construction activities to comply with the recommended limitations of the land capability systems on a lot-by-lot basis until adoption of a revised TRPA Regional Plan. Public facilities and improvements not on the property such as subdivision streets would not be included in the land coverage determinations.

The specifics of these recommended alternative actions are included in the draft EIS.

The following sub-alternative actions regarding case-by-case review of development proposals on individual lots could be adopted by TRPA on either a permanent basis or until adoption of a revised bi-state compact:

A. No Case-By-Case Review, No Development on Land Capability Classes 1a, 1c, 2, and 3

   The most stringent alternative would be to allow no case-by-case review to determine whether high hazard lots were buildable within coverage limitations, and to allow no cover overrides on any land capability class except for those found to be necessary for completion

of regional transportation or air quality elements, necessary for the protection of the public health and safety, or necessary for public recreation after all feasible alternatives not involving construction have been exhausted.

No further development would be permitted on land capability classes 1a, 1c, 2, and 3. Development would be permitted within coverage limitations on classes 4 through 7.

B. No Development on Land Capability Classes 1a, 1c, and 2, with Case-By-Case Review on Class 3 Lands Within the 5% Coverage Limitation

The alternative recommended by TRPA staff in the EIS would allow no further development on land capability classes 1a, 1c, and 2, and no case-by-case review would be undertaken on such lots. Case-by-case review would be done for lots in land capability class 3, to determine whether they could be developed with no water quality impacts within the 5% coverage limit. This limit would effectively preclude the development of smaller individual class 3 lots. Development of lots in classes 4 through 7 would be permitted within coverage limitations. No coverage overrides would be allowed except for projects found to be necessary for the completion of regional transportation or air quality elements, necessary for the protection of the public health and safety, or necessary for public recreation after all feasible alternatives not involving construction have been exhausted.

C. Development Permitted within Land Capability Coverage Limits on all Classes

The alternative adopted in the 1980 SWRCB Lake Tahoe Basin Water Quality Plan would permit development within land capability coverage limits on all classes. This alternative, if adopted on a permanent basis, would most closely correspond to the land development controls called for in the SWRCB Plan. No coverage overrides would be permitted on any capability class except for those found to be necessary for the completion of regional transportation or air quality elements, necessary for the protection of public health and safety, or necessary for public recreation after all feasible alternatives not involving construction have been exhausted. There would be no case-by-case review to determine the possibility of coverage overrides for individual development proposals. Any case-by-case review would be limited to a determination of whether or not development can take place with no impact upon water quality within the land capability coverage limitations. Since coverage limits are 1% for classes 1a, 1c, and 2 and 5% for class 3, this policy will effectively preclude development of all but very large parcels in these capability classes.

D. Case-By-Case Review and Consideration of Coverage Overrides for Classes 1a, 1c, 2, and 3

Case-by-case review would be performed on individual development proposals to determine if construction would be permitted on class 1a, 1c, 2, and 3 lands in excess of the land capability coverage constraints without resulting in adverse water quality impacts.

Development on classes 4, 5, 6, and 7 would still be restricted to within the coverage prescribed by the land capability system, except for development which is found to be necessary for the completion of regional transportation and air quality elements, is necessary for the protection of public health and safety, or is found to be necessary for public recreation after all feasible alternatives not involving coverage overrides have been exhausted.

E. Case-By-Case Review and Consideration of Coverage Overrides for All Land Capability Classes

Case-by-case review would be performed on all individual development proposals to determine if construction would be permitted in excess of land capability coverage limitation on all land classes without resulting in adverse water quality impacts. This would be the least stringent case-by-case sub-alternative. Present TRPA plans and ordinances permit coverage overrides on all land capability classes, although there is currently no specific provision for case-by-case review.

All of the above sub-alternative actions would also incorporate the following elements as specified by alternative action B-2 and C-2a on pages 85 through 88 of the draft EIS:

- The prohibitions and controls in the above sub-alterntive actions would not apply to lands within subdivisions approved by TRPA after February 10, 1972 in accordance with the Agency's land capability regulations after and where it is verified that the erosion controls required by such approvals have been properly installed and maintained.

- Development and analysis of alternative management plans for high erosion and high runoff hazard lands. Such a plan would incorporate appropriate best management practices and evaluate the feasibility of controlling erosion to within acceptable limits for each sub-class of land. This evaluation would include application of land coverage limits imposed by the land capability system.

- A process for identifying and recognizing man-modified areas such as pits and quarries where the proposed development restrictions would not apply. The process and criteria for identification of these types of areas is included in the TRPA Land Use Ordinance. Future development in these areas would be subject to mitigation measures determined as part of the administrative permit process.

- Amendments to the TRPA Land Use Ordinance will be required to fully implement these plan elements. However, the Agency will review applications to ensure consistency with adopted plans in accordance with the requirements of the TRPA Compact amendments.

- The Santini-Burton Bill as enacted by Congress requires identification of environmentally sensitive lands, including high hazard lands which may cause water quality degradation. To the extent required by this legislation, TRPA will participate in the identification of these areas which may be included in the acquisition plan required by federal law.

- Permitted land coverage would be calcuated using only the parcel or lot area in question and excluding off-site improvements such as public streets or rights of way. Land coverage would be in accordance with the requirements of the land capability system.

- Development of a management plan which specifically identifies existing undeveloped parcels which do not meet land coverage requirements. This plan would identify and assess alternative management proposals for these areas including a full range of options for adequate protection. These could include but would not be limited to more restrictive construction and drainage practices, transfer of development rights, transfer of land coverage from undeveloped areas and lot consolidation to meet coverage requirements.

- Provision for lot consolidation and/or expansion of project area. This would provide a mechanism for meeting land coverage requirements through consolidation of contiguous land.

- Consideration of transfer of land coverage from noncontiguous lands or from adjacent capability districts. The Agency will consider the water quality impacts of permitting transfer of land coverage from contiguous and noncontiguous lands as part of the Agency's revised Regional Plan.

- Existing non-conforming coverage would be permitted to be replaced pursuant to the requirements of existing TRPA Land Use Ordinance. This provides for reduction of land coverage according to a prescribed formula.

- A process for precise identification of land capability districts. Challenges to the land capability classification would be determined on a case-by-case basis.

SECTION V: CONSTRAINTS ON CHOICE OF ALTERNATIVE ACTIONS

A. Non-Degradation Policies

In order to be certified by the states of California and Nevada, and to be approved by the Environmental Protection Agency, TRPA's revised 208 Plan must ensure that no further deterioration of Lake Tahoe's water quality will take place. The SWRCB plan (1980) and the "Summary of Public Comments" on that plan include detailed discussions of the relevant state and federal non-degradation policies. These summaries are incorporated by reference.

The SWRCB plan, after analysis of the best available data, concludes that adherence to land capability coverage limits is among the minimum control measures necessary to prevent further degradation of Lake Tahoe. More stringent measures, such as the use of subdivision road coverage to determine coverage limits for individual lots, or a "no growth" alternative, would be necessary to begin reversal of the water quality degradation which has already occurred.

B. "State of the Art" Knowledge

While the sediment and nutrient loading models used in the TRPA (1977) and SWRCB (1980) 208 plans differ in a number of respects, they both predict sediment yields on the basis of entire watersheds, not lot by lot. The "state of the art" in erosion control technology does not permit the precise prediction of sediment and runoff loadings on a lot by lot basis, or the specification of control measures which will reduce these loadings to zero levels on any given lot. The SWRCB plan points out that further studies of parameters such as groundwater nutrient transport, atmospheric inputs, and exfiltration from sewers may show that more stringent development controls than those in the proposed alternative are necessary for the preservation of existing water quality. Given these uncertainties, any decision to allow coverage overrides should be made with extreme caution.

C. Requirements of the SWRCB for Certification of the TRPA 208 Plan

When it adopted a water quality plan for the California portion of the Lake Tahoe Basin in October, 1980, the California State Water Resources Control Board also adopted Resolution 80-81, setting conditions for the certification of a 208 Plan submitted by the Tahoe Regional Planning Agency. This resolution included the following findings relevant to the issue of case-by-case review:

- "Any 208 plan certified by the State Board must provide that further deterioration of the outstanding water quality of Lake Tahoe shall not be permitted."

- "Full implementation of the control measures in the State Board's plan on both sides of the Lake is needed to protect Lake Tahoe water quality."

- "The 208 plan must provide for implementation of each of the control measures set forth in Section B of Chapter III of the Lake Tahoe Basin Water Quality Plan prepared by the State Water Resources Control Board."

- "The 208 plan shall include reguatory programs to enforce controls relating to...(d)evelopment (r)estrictions...Except where other agencies make implementation commitments, the 208 plan must include a commitment by Tahoe Regional Planning Agency to enforce these programs."

- "The regulatory programs enforcing restrictions on development...shall not allow exceptions or variance except where such variances or exceptions are allowed under the Lake Tahoe Basin Water Quality Plan prepared by the State Water Resources Control Board."

- "The 208 plan submitted by the Tahoe Regional Planning may provide for enforcement of controls on an interim basis, pending adoption of an amended regional plan as provided by Compact amendments recently ratified by California and Nevada provided...(e)nforcement on an interim basis will not delay implementaion of any of the control measures."

Clearly, action taken by TRPA to allow extensive land capability coverage overrides on a case-by-case basis would not meet the requirements of SWRCB Resolution 80-81 for certification of the TRPA 208 plan.

D. Planning Considerations

If TRPA did decide to permit case-by-case review of lots in some or all capability classes for consideration of coverage overrides, such review would require a heavy outlay of staff time, and lengthy public hearings before the Advisory Planning Commission and Governing Board. In 1980, the California Tahoe Regional Planning Agency (CTRPA) undertook case-by-case review of a number of high hazard lots to determine whether they were individually buildable under its Urgency Ordinance. CTRPA's experience indicates that a team of at least three staff members would be required for each lot evaluation, and that, considering the number of potential applications, TRPA would need to commit at least nine people to case-by-case review in addition to the positions currently budgeted for project review. Such a commitment of staff time, when added to other responsibilities for development reivew, might seriously jeopardize TRPA's ability to complete the threshold study and regional plan update mandated by the revised bi-state compact within the required time limits. Approximately 46% of the undeveloped lots in the Basin are in capability classes 1, 2, and 3. Assuming that a proportionate number of these lots are allocated permits each year under the constraints of the bi-state compact, an

average of 740 class 1, 2, and 3 lots could be up for case-by-case review each year. Assuming further that permits would be allocated in the spring and reviews would be processed in the late spring and early summer, the Governing Board could be asked to hold hearings on over 100 lots per monthly meeting.

E. Equity

Since coverage overrides have clear adverse impacts on environmental quality (Sections II and VI), any decision to permit them would be made primarily on the basis of equity for landowners. Case-by-case review to determine whether an override could be allowed would be beneficial to the landowner by giving him the opportunity to present detailed evidence to the TRPA staff and Governing Board.

Any decision to permit a coverage override would depend upon the technical merits of the landowner's proposal and his commitment to install and maintain erosion and drainage controls. This would tend to prejudice approvals in favor of landowners who appear to be able to provide the best mitigation proposal. Appearances can be deceiving, and the TRPA would have no way of assessing the effectiveness of any proposed mitigation package until after all construction and development is completed. The best way to ensure equity is to establish a clearly defined regulation and apply it uniformly without prejudice. Application of land capability coverage constraints in a uniform and consistent manner would provide for such equity. Case-by-case review, on the other hand, could allow other factors not related to water quality or environmental protection to enter into the decision making process.

SECTION VI: ENVIRONMENTAL IMPACTS OF CASE-BY-CASE REVIEW

The impacts of various levels of development controls, including adherence to the land capability system, have been assessed in the draft EIS, and in the environmental analyses of the SWRCB (1980) 208 plan and the CTRPA (1980) regional plan update. These analyses have been incorporated by reference into the draft EIS, and will not be repeated here. Adherence to the land capability coverage limits has been shown to be necessary for the protection of water quality. The allowance of variances from the system would lead to significant cumulative adverse impacts on water quality and possibly on other environmental parameters. The magnitude of the impacts would depend on the numbers and locations of variances granted, on whether the variance policy was applied on an interim or a permanent basis, and on the effectiveness of mitigation measures.

A. Soils and Geology

Coverage overrides on high hazard lands would lead to increased disruption, displacement, and compaction of soil, increased loss of soil to wind and water erosion, and increased exposure of people and property to geological hazards such as earthquakes, landslides, and ground failure.

B. Water

Coverage overrides on all capability classes, and especially on high hazard lands, would lead to increased cumulative nutrient loadings for surface waters from erosion and surface runoff. Removal of vegetation and creation of impervious surface would change absorption rates, drainage patterns, and the amount of surface runoff. Removal of vegetation on lands of all capability classes would increase the cumulative transport of nutrients to Lake Tahoe via groundwater. The cumulative effect of coverage overrides on water quality would be continued deterioration of the physical, chemical, and biological quality of Lake Tahoe, which is prohibited by state and federal law.

C. Biota

Coverage overrides permitting building on high hazard lands would increase disturbance of vegetation and wildlife, particularly on class 1c lands, which are characterized by their fragile flora and fauna. This could include disturbance of rare, endangered, or sensitive species, as described in the EIS. Aquatic habitat in Lake Tahoe and its tributaries would deteriorate as a result of increased sediment and nutrient loadings, although some species (e.g., certain algae) might be stimulated abnormally. Increased siltation would have adverse effects on fish spawning habitat and fish food organisms.

D. Impacts Related to Urbanization

The allowance of additional variances to the land capablity system would result in increased demands on public services, and increased levels of adverse environmental impacts associated with urban development (air pollution, traffic congestion, noise, light and glare, energy and resource consumption). The proposed restrictions on development of high hazard lands would tend to concentrate further development in already urbanized areas. Variances to these restrictions would reverse this trend, decreasing the visual quality of the environment, and opportunities for open space and outdoor recreation. Such an extension of urban impacts would increase the risk of damage to undiscovered cultural and historical sites.

E. Summary of Significant Imacts

1. Unavoidable adverse impacts.

Disturbance of land in excess of land capability coverage limits has adverse impacts on soils, water quality, vegetation, and wildlife. These cumulative impacts cannot be fully mitigated on-site, even through the use of Best Management Practices. Adherence to land capability is the best practice for prevention of water qualtiy damage due to erosion and surface runoff.

2. Relationship between local short-term uses of man's environment and the maintenance and enchancement of long-term productivity.

The allownace of variances to coverage limits would continue the previous TRPA policy of approving overrides "for reasons of equity and economic considerations, to the long-term detriment of the Tahoe Basin's environment and its value as a national resource "(draft EIS, page 149).

3. Significant irreversible or irretrievable commitments of resources involved in proposed project.

Overrides of allowable coverage would mean irreversible commitments of high hazard lands to development, and possibly increased commitments of energy and resources to expansion of public services outside of existing urban areas. Since it is infeasible to treat Lake Tahoe's water for nutrient removal, any sediment which reaches the Lake constitues an irreversible decrease in Lake Tahoe's value as a resource.

4. Cumulative impacts of the project.

Construction allowed in excess of land capability limitations could cumulatively contribute to degradation of water quality, to disturbance of natural aquatic and terrestrial ecosystems, and to an increase in other adverse environmental impacts associated with urbanization.

SECTION VII: MITIGATION MEASURES

Mitigation measures for the impacts of additional development on low hazard lands in the Tahoe Basin have been discussed at length in the draft EIS, and in EPA (1979), SWRCB (1980), Jones and Stokes (1978), and Brown and Caldwell (1981), which were incorporate by reference into the EIS. The following discussion emphasizes additional mitigation measures for water quality impacts which would be required if coverage overrides were permitted on high hazard lands.

A. Development Review Criteria

The criteria developed by CTRPA staff in their case-by-case review of lots under the Urgency Ordinance could be used as the basis for a system of criteria to be considered by TRPA staff in assessing the feasibility of coverage overrides. These criteria are included in Appendix A to this supplement.

B. Governing Board Findings

The SWRCB 208 plan allows variances from the land capability coverage limits when the Lahontan Regional Board finds that the project is "reasonably necessary" to control existing sources of erosion or water pollution, to carry out the Lake Tahoe Basin Non-attainment Air Quality Plan (including regional transportation elements required by the plan, such as bike trails), or to provide for health, safety, or public recreation. Strict on-site control measures and/or offset measures are to be required for any project granted such a variance. The proposed amendments to the TRPA plans ordinances allow for similar variance findings by the TRPA Governing Board.

The revised bi-state compact (Public Law 96-551) requires TRPA to make certain environmental findings in connection with approval of any project:

1. "A decision by the agency to approve a project shall be supported by a statement of findings, adopted by the agency, which indicates that the project complies with the regional plan and with applicable ordinances, rules, and regulations of the agency."(Article IV, Subdivision (g) (2))

2. "The agency shall adopt ordinances prescribing specific written findings that the agency must make prior to approving any project in the region. These findings shall relate to environmental protection and shall ensure that the project under review will not adversely affect implementation of the regional plan and will not cause the adopted environmental threshold carrying capacities of the region to be exceeded." (Article V, Subdivision (g))

3. "Before adoption by the agency of the ordinances required in subdivision (g) of Article V, the agency may approve a project in the region only after making written findings on the basis of substantial evidence in the record that the project is consistent with the regional plan then in effect and with applicable plans, ordinances, regulations, and standards of federal and state agencies relating to the protection, maintenance and enhancement of environmental quality in the region." (Article VI, Subdivision (b))

   The ordinances required by Article V, Subdivision (g) will not be adopted until the completion of the new regional plan. Thus any TRPA approvals of coverage overrides during the next two years must be made on the basis of the "substantial evidence" required by Article VI, Subdivision (b). The applicable federal and state regulations mentioned in this section include the non-degradation policies discussed above. Considering that all environmental thresholds have not been defined, that water quality impacts cannot be accurately predicted on a lot by lot basis, and that such impacts may be cumulatively considerable, it may be difficult for TRPA to defend the required findings to approve variances from the land capability system for construction on high hazard lands.

   At its March meeting the TRPA adopted its first ordinance since reorganization under the revised bi-state compact. This ordinance defines what constitutes a project pursuant to the requirements of Article VII of the revised bi-state compact. All construction activities on low capability lands except for miscellaneous improvements to existing structures, are defined as projects in the new ordinance. As a result Environmental Impact Statements or other environmental documents would be required for such development projects in any case. Thus, in a sense, case-by-case review of such projects is already required by the ordinance adopted by the TRPA. Extensive findings of minimum impacts and mitigation measures will be necessary for each project requireing an EIS pursuant to Article VIII of the revised bi-state compact.

C. On-site Control Measures

The use of Best Management Practices (BMP's) is now required for all development permitted by TRPA. It has not been shown (SWRCB, 1980) that BMP's are adequate to prevent water quality problems arising from the development of high hazard lands. Any project applicants granted coverage overrides in a case-by-case review situation should be required to implement erosion and drainage control measures over and above Best Management Practices.

It has been suggested that TRPA should permit a limited number of construction projects to proceed on high hazard lands on a demonstration basis, to show what can be accomplished with innovatively engineered erosion and drainage controls. It may be most prudent to encourage (and perhaps provide grant funding for) such projects outside of the Tahoe Basin, on lands with similar soils, slopes, climate, and vegetation,

where water quality impacts of a failure would be less drastic. If demonstration projects are permitted in the Tahoe Basin, the following minimum requirements should be applied:

1. Design, construction, maintenance and monitoring of the control systems should be done by qualified professionals approved by TRPA and paid by the applicant.

2. Construction should be preceeded by a minimum of one year's monitoring of surface and groundwater quality to establish baseline conditions above, below, and on the site, under normal and "worst case" hydrologic conditions.

3. Monitoring should continue during and after construction using "state of the art" techniques such as:

   a. quantity and quality minitoring of all surface runoff entering and leaving the proposed development site

   b. quantity and quality monitoring of all runoff entering infiltration facilities on the site and at various underground locations adjacent to the infiltration gallery

   c. placement of suction lysimeters at numerous locations on the site to monitor soil moisture quality

   d. placement of soil moisture blocks to monitor changes in soil moisture at numerous locations on the site

   e. quantity and quality of all precipitation falling on the site

   f. monitoring of cumulative surface runoff quantity and quality from the development and/or watershed as a whole

   g. water quantity/quality monitoring for all development permitted under such a program should be coordinated by a single independent investigating entity whose services are supported by fees paid by the applicants.

4. The project should be accompanied by a detailed Environmental Impact Statement.

Maximum coverage limits should be set for overrides on all land capability classes. They should be no greater than the coverage needed to build a single family home; the excessive overrides now permitted by TRPA for some commercial and public service projects should be eliminated.

D. Offset Measures

In order to prevent further degradation of Lake Tahoe's water quality, major reductions in existing sediment and nutrient inputs are necessary, and no major increases in these parameters can be allowed. The proposed amendments to the TRPA 208 Plan and implementing ordinances require local governments and/or individuals to offset future development on low hazard lands by funding remedial projects for correction of existing erosion and surface runoff problems. For new development to be permitted on high hazard lands through land capability coverage overrides, offset measures over and above those already required in the plan would be necessary. No such measures appear to be available.

SECTION VIII: CONCLUSIONS AND RECOMMENDATIONS

The imprecise "state of the art" in erosion control technology makes it impossible to assure that state and federal non-degradation requirements for Lake Tahoe can be met if further overrides of land capability coverage limitations are permitted in the Tahoe Basin. Environmental thresholds for parameters other than water quality have not yet been defined; additional building on high hazard lands could affect TRPA's ability to insure that environmental threshold carrying capacities are not exceeded and that environmental standards are met.

The commitment of staff and Governing Board time which would be needed for case-by-case review of applications for coverage overrides could jeopardize TRPA's ability to meet the planning deadlines set forth in the bi-state compact.

The proposed alternative, which provides for only limited case-by-case review of class 3 lots, gives owners of high hazard lots a number of options including alternative uses, public purchase, and transfer of development rights. It imposes interim restrictions of environmental threshold carrying capacities and development of permanent land use management plans. There are sufficient undeveloped low hazard lots in the Tahoe Basin to use the numbers of permits allowed by the bistate compact during the interim period. Consideration of modification to the land capability system should be a long-term project, to be implemented once environmental thresholds are established and as the "state of the art" for prediction and control of erosion and surface runoff problems improves. Improved technology may someday permit refinement of the system and provide assurance that greater coverage on some sites will not adversely affect water quality. On the other hand, ongoing studies may show that even greater coverage restrictions are needed. Present knowledge indicates that adherence to the land capability system is absolutely necessary for the protection of Lake Tahoe.

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APPENDIX A
1980 CTRPA CASE-BY-CASE
LOT REVIEW CRITERIA

I. VEGETATIVE COVER

A. How can vegetation characteristics be applied to decisions on lot suitability?

1. Nature of cover determines its susceptibility to damage, temporary and permanent. What is potential for recovery?

2. Nature of cover reveals moisture regime information.

B. Three Classes of Rating

1. Vegetation on-site amenable to development with little loss or deterioration other than on construction site - low hazard.

2. Vegetation would sustain some damage due to construction - moderate hazard.

3. Vegetation on-site would be devastated by construction and use of site for housing - high hazard.

C. Recognizable Features

1. Density of Layering

a. Good soil cover at ground level and with tree cover.

b. Good soil cover with trees and some shrubs - large trees that would survive development.

c. Moderate soil cover with trees and/or shrubs.

d. Poor soil cover or high potential for loss due to construction.

2. Vigor and Age Classes

a. Heavy competition (as with lodgepole) or very old large trees or weak shrubs (shaded out) would rate as high hazard because of high potential for loss with construction.

b. Very young trees or small shrubs, as on a logged site, would have moderate potential for loss.

c. Well established trees and shrubs and ground cover, vigorous and effective. Highly resistant to deterioration due to development.

3. Type of Vegetation

a. Certain species are indication of land suitability.

b. Certain species are especially sensitive to disturbance (lodgepole and manzanita).

II. PROXIMITY TO STREAM OR WET LAND

A. In marsh, meadow or SEZ. Definite No. - High

B. Construction necessary adjacent to SEZ. - Moderate

1. Within area of influence? (i.e., on slope "above" SEZ).

C. Construction well beyond SEZ (a few hundred feet). Yes if intervening riparian zone is well vegetated.

III. RUNOFF POTENTIAL: Present status of site - how well is it handling runoff?

A. Strong evidence of potential for on-site erosion and concentration of runoff if disturbance takes place. Need to consider adjacent parcels, their condition and relation to hydrology of subject parcel. Is the parcel low, relative to others? Is it receiving runoff from adjacent lands and thus essential as a channel or water conveyor? Steepness of parcel is critical. 9% is significant. - High

B. Some evidence of runoff problems - site has 5-10% slope and/or adjacent areas are as steep or steeper and thus would receive concentrated runoff from construction. - Moderate

C. Little potential for runoff problems. - Low

IV. LAND STABILITY

A. Evidence of mass instability, slumping. Could include large road fills perched over parcel. Access construction should be considered, must often cross unstable fill or require cutting and filling for parking and driveway. - High

B. Site apparently stable but contains springs or areas that would become unstable if constructed upon. Development would not disturb springs. - Moderate

C. No evidence of instability or potential for it. - Low